REPORT No. 60 JANUARY, 1933

DEPARTMENT OF AGRICULTURE
GOVERNMENT RESEARCH INSTITUTE
FORMOSA, JAPAN

KINTARO OSHIMA, *Director*

---

# ALEYRODIDAE OF FORMOSA PART II

# OBSERVATIONS ON THE COCCIDAE OF FORMOSA PART III

By

RYOICHI TAKAHASHI

---

PUBLISHED BY THE INSTITUTE
TAIHOKU, FORMOSA

# CONTENTS


| | PAGE |
|---|---|
| Aleyrodidae of Formosa. Part II. | |
| Introduction. ... ... ... ... ... ... ... ... ... ... ... ... | 1 |
| Notes on the host selection in the Aleyrodidae. ... ... ... | 1 |
| Food plant catalogue of the Formosan Aleyrodidae. ... ... | 2 |
| New or little-known Formosan Aleyrodidae. ... ... ... ... | 5 |
| A new aleyrodid infesting mulberry in Loochoo. ... ... ... | 21 |
| Index. ... ... ... ... ... ... ... ... ... ... ... ... ... | 24 |
| Observations on the Coccidae of Formosa. Part III. | |
| Introduction. ... ... ... ... ... ... ... ... ... ... ... ... | 25 |
| Food plant catalogue of the Formosan Coccidae. ... ... ... | 25 |
| New or little-known Formosan Coccidae. ... ... ... ... ... | 34 |
| A new species of *Chrysomphalus* from Loochoo. ... ... ... | 57 |
| List of species recorded from Formosa since the publication of the part II. ... ... ... ... ... ... ... ... ... ... ... | 58 |
| Index. ... ... ... ... ... ... ... ... ... ... ... ... ... | 63 |

# ALEYRODIDAE OF FORMOSA. II.

By

Ryoichi TAKAHASHI.

---

## Introduction.

Since the preparation of the part 1 of this series of papers I have continued to study these insects and the results are here presented. This report embodies notes on the food habits of these insects and records and descriptions of certain new or little-known species attacking various cultivated and wild plants in Formosa. A list of the host plants and the description of a new species infesting mulberry in Loochoo are also included.

All the type specimens will be preserved in the Entomological Museum of the Department of Agriculture, Government Research Institute, Taihoku, Formosa.

I wish here to acknowledge my indebtedness to Prof. T. SHIRAKI for his kind help in various ways and also to Prof. T. Esaki and Mr. S. Minowa who have kindly collected interesting specimens in Formosa and Loochoo respectively.

## Notes on the host selection in the Aleyrodidae.

The insects of the family Aleyrodidae comprise a large proportion of polyphagous species. These polyphagous species attack a very wide range of plants, but not indiscriminately, being confined to certain plants which have in common some definite physical characters.

*Dialeurodes citri* ASHM., *D. cinnamomi* TAKAH., *D. hibisci* KOTIN., D. *fici* TAKAH., *Aleurotuberculatus gordoniae* TAKAH., *Aleuroplatus pectiniferus* QUAINT. et BAKER, *Aleurocanthus spinosus* KUW., etc. are polyphagous species not restricted to a narrow range of related plants, but their hosts are almost exclusively evergreen, with smooth leaves destitute of hairs. It is remarkable that these species excepting *Aleurocanthus spinosus* KUW. do not possess very long setae on the dorsum of pupa case and other species lacking eminent dorsal setae in the grown larval stage also

show a tendency to prefer such plants with smooth leaves. On the other hand, *Acanthaleyrodes callicarpae* TAKAH., another polyphagous species, feeds on *Callicarpa* (Verbenaceae) and *Rubus* (Rosaceae) which are provided with soft leaves covered with hairs. This whitefly is armed with many eminent dorsal spines on the pupa case, and some other species, the pupa cases of which have very long stout dorsal setae, seem to be also adapted to the leaves covered with hairs.

In this connection other similar cases might be adduced, such as some species of Coccidae and the weevil, *Apoderus brachialis* Voss, both attacking a wide range of plants almost always with smooth leaves destitute of hairs, as pointed out in my previous papers.*

From these it is certain that the physical characters of the leaves of plants are important factors in the host selection in some polyphagous insects, a phase of the food plant problem that needs attention in the insect biology.

## Food plant catalogue of the Formosan Aleyrodidae (2).

A list is given of the plants which have become known to be attacked by these insects in Formosa since the publication of the former report. *Bemisia myricae* KUWANA had not been found on *Morus* in our island when the former report was prepared, but it has been observed in abundance on it since that time.

This list of food plants will be lengthened with further exploring.

Actinodaphne sp. (Lauraceae).
- Aleurocanthus cinnamomi TAKAH.
- Aleurodicus machili TAKAH.
- Tuberaleyrodes machili TAKAH.

Agalma lutchuense (Araliaceae).
- Dialeurodes (Dialeurodes) citri ASHM.

Antidesma sp. (Euphorbiaceae).
- Aleurothrixus antidesmae TAKAH.

Bladhia sp. (Myrsinaceae).
- Dialeurodes (Rachisphora) fici TAKAH.

Bobua glauca (Symplocaceae).
- Aleurotuberculatus gordoniae TAKAH.

Celtis sinensis (Ulmaceae).
- Aleurotuberculatus psidii SINGH.

* Dobutsugaku Zasshi (Zool. Mag. Tokyo), vol. 40, 1928, p. 199 and Dept. Agr., Gov't. Res. Inst. Formosa, Rept. no. 40, 1929, p. 4.



Cinnamomum camphora, var. nominale (Lauraceae).
- Aleurocanthus cinnamomi TAKAH.
- Aleurotuberculatus psidii SINGH.

Cinnamomum reticulatum.
- Dialeurodes (Rachisphora) koshunensis TAKAH.

Cinnamomum sp.
- Aleurocanthus cinnamomi TAKAH.
- Aleurodicus machili TAKAH.
- Tuberaleyrodes machili TAKAH.

Cinnamomum zeylanicum.
- Dialeurodes (Rachisphora) koshunensis TAKAH.
- Tuberaleyrodes machili TAKAH.

Cryptocarya chinensis (Lauraceae).
- Aleyrodes cinnamomi TAKAH.
- Dialeurodes (Gigaleurodes) cinnamomi TAKAH.

Ehretia sp. (Borraginaceae).
- Dialeurodes (Dialeurodes) citri ASHM.

Elaeocarpus serratus (Elaeocarpaceae).
- Bemisia myricae KUW.

Erycibe acutifoliae (Convolvulaceae).
- Aleurocanthus spiniferus QUAINT.

Eurya sp. (Camelliaceae).
- Aleurotuberculatus gordoniae TAKAH.

Eugenia jambos (Myrtaceae).
- Aleuroplatus (Aleuroplatus) pectiniferus Qnaint. et BAKER.
- Aleurotuberculatus psidii Singh.
- Dialeurodes (Gigaleurodes) cinnamomi TAKAH.

Eugenia sp.
- Aleurocanthus eugeniae TAKAH.

Evodia roxburgiana (Rutaceae).
- Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et BAKER.

Ficus sp. (Moraceae).
- Aleuroplatus (Aleuroplatus) pectiniferus Quaint. et BAKER.

Gramineae (a plant of the).
- Bemisia formosana TAKAH.

Hibiscus rosa-sinensis (Malvaceae).
- Bemisia hibisci TAKAH.

Ilex pubescens (Aquifoliaceae).

Aleurotuberculatus gordoniae TAKAH.

Machilus spp. (Lauraceae).

Aleurotuberculatus gordoniae TAKAH.

Dialeurodes (Rabdostigma) shintenensis TAKAH.

D. (Rachisphora) koshunensis TAKAH.

D. (Rachisphora) kuraruensis TAKAH.

D. (Rachisphora) reticulata TAKAH.

Melastomaceae (a plant of the).

Aleurocanthus spinosus KUW.

Meliosma rigida (Sabiaceae).

Aleurocanthus spiniferus QUAINT.

Dialeurodes (Dialeurodes) citri ASHM.

Miscanthus sp. (Gramineae.)

Aleurolobus barodensis MASK.

Morus alba (Moraceae).

Bemisia myricae KUW.

Murraya exotica (Rutaceae).

Aleurotuberculatus jasmini TAKAH.

Pyracantha koidzumii (Rosaceae).

Aleurotuberculatus pyracanthae TAKAH.

Dialeurodes (Dialeurodes) citri ASHM.

Quercus glauca (Fagaceae).

Trialeurodes kankoensis TAKAH.

Rhamnus formosana (Rhamnaceae).

Dialeurodes (Rachisphora) fici TAKAH.

Rubus sp. (Rosaceae).

Acanthaleyrodes callicarpae TAKAH.

Aleurotrachelus rubi TAKAH.

Salix glandulosa, var. warburgi (Salicaceae).

Bemisia yanagicola KUW. (MS.).

Scolopia oldhami (Flacourtiaceae).

Aleurocanthus spinosus KUW.

Aleurotrachelus caerulescens SINGH.

Aleurolobus scolopiae TAKAH.

Viburnum awabucki (Caprifoliaceae).

Dialeurodes (Dialeuropora) viburni TAKAH.



## New or little-known Formosan Aleyrodidae.

### Dialeurodes (Rachisphora) kuraruensis n. sp.

(Pupa case) Pale brown, with no secretion evident. Broad, somewhat narrowed posteriorly, broadest behind the thoracic tracheal pores, not indented at the hind end. Mid-thoracic and transverse* sutures not reaching the margin; abdominal segments distinct on the median area, rhachis absent, a pair of wide chitinized parts present on the front margin of the 8th abdominal segment. Dorsum reticulated on the submarginal area, with many rather short lines running mesad from the margin,

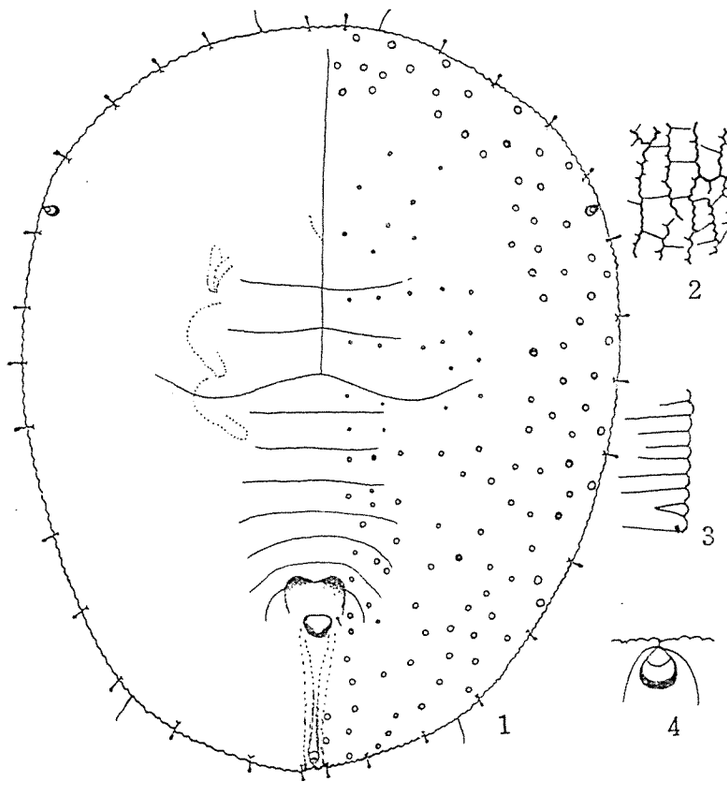


Fig. 1.
*Dialeurodes kuraruensis* n. sp.
(Pupa case)
(1) Outline. (2) Submarginal markings. (3) Margin.
(4) Thoracic tracheal pore.

* Transverse suture=a suture between the thorax and abdomen.

and many small circular pores scattered, the pores on the submarginal area larger, with the margin thickened and chitinized; about 30 short capitate setae arranged in a single row along the margin, which are equal in length, reaching beyond the margin; a pair of short setae present near the vasiform orifice. Margin with a pair of short setae on the anterior and posterior parts, which are longer than the capitate setae; teeth very small, short, much wider than long, rounded. Thoracic tracheal folds not discernible, the pores very small, just within the margin, without teeth. Caudal furrow very long, slender, but not eminent, expanded basally, without markings, the distal pore very small. Vasiform orifice small, wider than long, subcordate, lacking teeth, not notched, rounded at the hind margin. (Operculum and lingula are broken in my specimens and are not described.) Length of pupa case—about 1.45 mm.

Host.—Machilus sp.

Hab.—Kuraru near Koshun.

Collected by me on May 26, 1932. Differs from other species in possessing about 30 capitate setae arranged in a single row and in the presence of eminent dorsal pores.

The genus *Dialeurodes* at present includes many diversified forms and a more detailed study of these will no doubt necessitate the breaking up of the genus. The subgenus *Rachisphora* and some other subgenera seem to merit elevation to generic rank, but now I follow the system of Quaintance and Baker.

### Dialeurodes (Rachisphora) koshunensis n. sp.

(Pupa case) Pale brown, with no secretion, evident. Oval, not or scarcely constricted across the thoracic tracheal pores. Mid-thoracic and transverse sutures not reaching the margin, abdominal segments distinct; rachis distinct, without tubercles. Cephalothorax with longitudinal folds as shown in the figure. Many short stout capitate setae and fewer (about 11) simple setae arranged nearly in a row along the margin, which are equal in length, reaching beyond the margin, each arising from a small tubercle, the simple setae pointed apically, somewhat swollen near the base; many similar but stouter capitate setae present on the dorsum as shown in the figure, a pair of simple setae present on the anterior part of cephalothorax, on the 1st abdominal segment and near the vasiform orifice. Margin not crenate, with a pair of setae on the anterior and posterior parts, which are longer than the dorsal setae. Thoracic tracheal folds not discernible, but the pores distinct, small, not complete, without teeth. Caudal furrow not distinct, expanded basally, with no distinct markings, the distal pore as in the thoracic ones. Vasiform orifice small, wider than long, rounded on the lateral and posterior margins, thickened on the margin. slightly notched at the hind end, lacking teeth, on an elevated area. Operculum a little wider than long, occupying most of the orifice, narrowed towards the hind margin nearly straight. Lingula scarcely exposed. Antennae long, slender, with a short apical process. Length of pupa case—about 1.2 mm.

Hosts.—Cinnamomum zeylanicum, C. reticulatum, Machilus sp.

Hab.—Kuraru, Garambi, Kagi.

Taken by me in May 1932. Near to *Dialeurodes capitatis* CORBETT, but may be easily distinguished from it by the shape of dorsal setae.



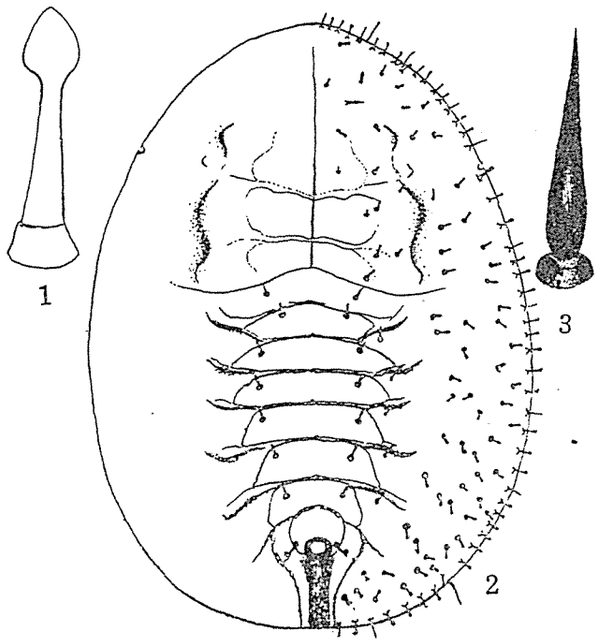


Fig. 2.
*Dialeurodes koshunensis* n. sp.
(Pupa case)
(1) Dorsal capitate seta. (2) Outline.
(3) Submarginal simple seta.

### Dialeurodes (Rachisphora) reticulata n. sp.

(Pupa case) White. Much elongated, narrow, nearly parallel on the sides, more than twice as long as wide, wanting long setae. Transverse suture not reaching the margin; abdominal segments distinct on the median area; rachis a little developed, short, not reaching the margin. Dorsum except on the median area densely with numerous small irregular cells and appears to be reticulated; many small rounded chitinized papillae present on the dorsum, which are mostly paired, smaller than the dorsal irregular cells, and sparsely scattered; a few very short stout capitate setae present on the dorsum, but absent on the margin. A pair of ridges present on the

cephalothorax, which are diverging anteriorly, nearly reaching the margin. Margin a little more chitinized, faintly crenate, with a pair of rather long latero-anterior setae, and a pair of very stout setae at the hind end, which are rather short, pointed apically. Thoracic tracheal folds not distinct, without dots; the pores very small, nearly complete, just within the margin, with 2 very small pointed teeth. Caudal furrow long, narrow, chitinized on the lateral margins of the posterior part, expanded on the basal part; the distal pore not completely closed, larger than the thoracic tracheal ones, with 2 teeth which are not discernible in some specimens. Vasiform orifice as long as wide, subcordate, rounded on the hind margin, a little notched at the hind end, thickened on the lateral margins, without teeth. Operculum nearly similar in shape to the orifice, filling it. Lingula scarcely exposed. Antennae very long, slender, reaching beyond the bases of middle legs, with a short apical process, about 0.208 mm. in length (excluding the apical process). Length of pupa case—about 1.55 mm.

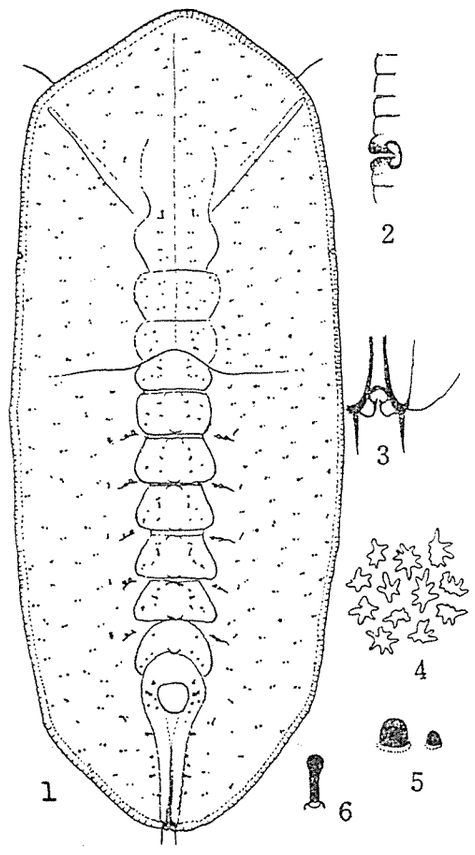


Fig. 3.
*Dialeurodes reticulata* n. sp.
(Pupa case)
(1) Outline.
(2) Margin and thoracic tracheal pore.
(3) Posterior end.
(4) Dorsal cells.
(5) Paired papillae.
(6) Dorsal capitate seta.

Host.—Machilus sp.

Hab.—Kanko near Shinten.

Collected by me on Sept. 5, 1932. This species is characterized by the much elongated body, as well as by the absence of marginal capitate setae.

**Dialeurodes (Dialeuropora) viburni** n. sp.

(Pupa case) White, slightly with a white powder. Elliptic, somewhat narrowed



on the anterior part, flattened, thin, not constricted across the thoracic tracheal folds, slightly or scarcely indented at the hind end. Mid-thoracic and transverse sutures not eminent, not reaching the margin; abdominal segments distinct on the median area. Dorsum lacking papillae and minute pores, but with 5 pairs of large circular or subcircular pores on the submarginal area, which are somewhat chitinized on the margin, subequal in size in the anterior 4 pairs; the last pair a little smaller; 24 rather long fine setae arranged in a single row along the margin, which are subequal in length, far reaching beyond the margin; many short faint lines running mesad from the margin; a pair of short fine setae present in front of the vasiform orifice; a shorter seta laterad of the orifice; 2 pairs of short fine setae in front of the last pair of submarginal pores. Margin not toothed, with a pair of short setae on the anterior and posterior parts. Thoracic tracheal folds faintly discernible, short, without dots, not forming a pore at the distal end. Caudal furrow not distinct, without markings. Vasiform orifice small, as long as wide, somewhat narrowed towards the hind margin, rounded, somewhat thickened on the anterior margin, not notched, without teeth. Operculum rectangular, short, rounded on the lateral margins, straight on the anterior margin, somewhat indented on the hind margin, filling half the orifice. Lingula reaching beyond the hind margin of the orifice, a little divided apically. Antennae short, slender, with a long stout seta at the tip. Length of pupa case—about 1.26 mm.

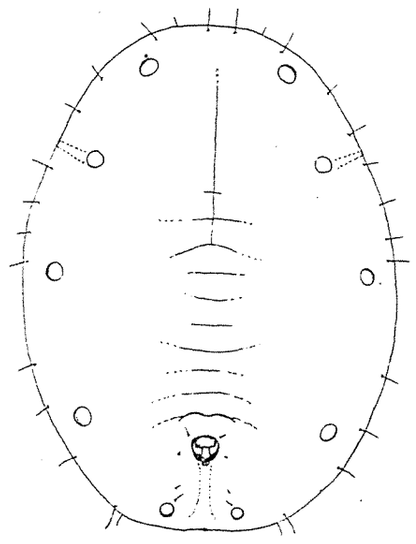

Fig. 4.
*Dialeurodes viburni* n. sp.
(Pupa case)

Host.—Viburnum awabucki.

Hab.—Garambi near Koshun.

Observed in abundance on May 26, 1932. This species is allied to *D. brideliae* Takah., but differs in lacking dorsal papillae, in the positions of the submarginal pores, and in other structures.

**Dialeurodes (Gigaleurodes) formosensis** n. sp.

(Pupa case) Pale yellowish brown, with no secretion evident. Elliptic, not

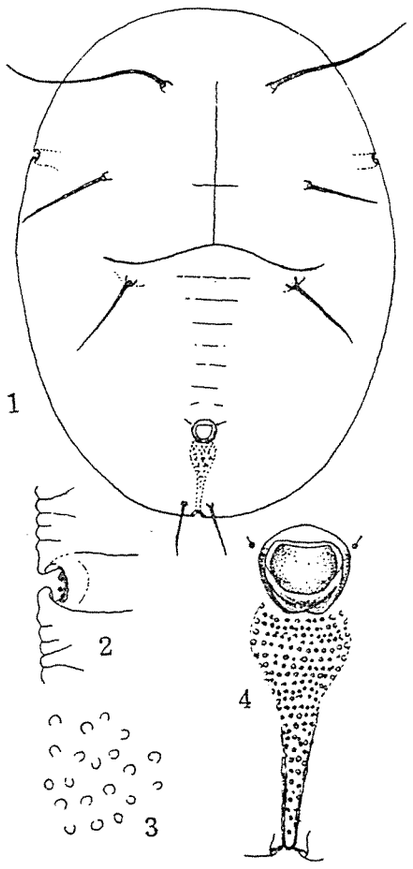


Fig. 5.
*Dialeurodes formosensis* n. sp.
(Pupa case)
(1) Outline.
(2) Margin and thoracic tracheal pore.
(3) Dorsal papillae.
(4) Vasiform orifice and caudal furrow.

narrowed anteriorly, not constricted, thin. Mid-thoracic and transverse sutures not reaching the margin, abdominal segments discernible on the median area. Dorsum with numerous small short rounded papillae scattered, a pair of minute setae near the vasiform orifice, and 4 pairs of long stout setae, the anterior pair longer, somewhat curved, reaching beyond the margin, the last pair shortest, each seta arising from a small tubercle. Marginal teeth very small, much wider than long, rounded. Thoracic tracheal folds faintly discernible, short, without dots and markings; the pores not closed, with 2 small rounded teeth. Caudal furrow distinct, widened on the anterior part, narrowed towards the hind end on the posterior part, scarcely chitinized on the lateral margins, with numerous small granules which are arranged in transverse rows on the anterior half; the diatal pore somewhat chitinized on the margin, opened, with no teeth. Vasiform orifice nearly as long as wide, a little narrowed towards the hind margin, somewhat notched at the hind end, thickened on the anterior margin, without teeth. Operculum wider than long, rounded on the lateral margins, nearly straight on the hind margin, occupying more than half the orifice. Lingula not visible. Length of pupa case—about 1.0 mm.

Host.—Unknown.

Hab.—Kuraru near Koshun.

Collected by me on May 25, 1932. This species is related to *D. multipori* Takah., but differs in the absence of ventral pores, in the characters of vasiform orifice, etc.



**Dialeurodes (Rabdostigma) shintenensis** n. sp,

(Pupa case) White. Much elongated, more than twice as long as wide, thin, narrowed on the anterior and posterior parts, without long setae and ridges. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments distinct on the median area; rachis absent. Dorsum with many small circular pores scattered except on the central area, and numerous very small shallow rounded papillae densely scattered, which are much fewer on the central area and chitinized on the apex; central area with markings as shown in the figure; a pair of very short stout fan-like setae present in front of the vasiform orifice. Margin not chitinized, crenate; teeth very short, small, much wider than long, very broadly rounded; a pair of rather long setae present on the anterior and posterior parts of the margin. Thoracic tracheal folds not eminent, with many minute dots; the pores very small, opened, without distinct teeth. Caudal furrow distinct, extremely long, narrow, expanded on the basal part, not chitinized on the lateral margins, with many small or medium-sized, oval or circular markings more or less arranged in transverse rows on the basal expanded part, many distinct polygonal sculptures on the anterior half of the narrow part, and many much elongated narrow scalptures on the posterior half of

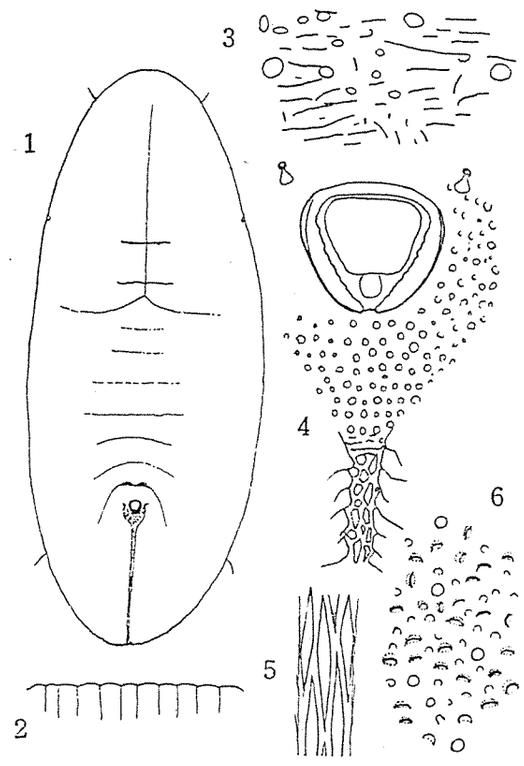


Fig. 6.
*Dialeurodes shintenensis* n. sp.
(Pupa case)
(1) Outline. (2) Margin.
(3) Median markings of dorsum of abdomen.
(4) Fan-like setae, vasiform orifice and basal part of caudal furrow.
(5) Distal part of caudal furrow.
(6) Dorsal papillae and pores.

the narrow part; the posterior end nearly as in the thoracic tracheal folds. Vasiform orifice small, cordate, somewhat wider than long, rounded at the hind end, thickened on the lateral margins, with teeth scarcely discernible. Operculum wider than long, nearly straight on the hind margin, occupying most of the orifice. Lingula a little exposed. Venter with a pair of long setae and a pair of short stout spines laterad of the vasiform orifice, the spines not sharply pointed apically, curved. Antennae slender, with a distal process, about 0.161 mm. in length (excluding the distal process). Length of pupa case—about 2.9 mm.

Host.—Machilus sp.

Hab.—Shinten near Taihoku.

Described from specimens collected in October 1932. This species resembles *D. oweni* SINGH, being different, however, in the structures of thoracic tracheal folds and vasiform orifice, in the much larger body, and in possessing many dorsal papillae. Not yet found elsewhere than in Shinten.

### **Tuberaleyrodes machili** TAKAH.

Aleyrodid. Formosa, part 1, p. 29 (1932).

Hosts.—Machilus spp., Actinodaphne sp., Cinnamomum zeylanicum, C. sp.

Hab.—Taiheizan, Urai, Kagi, Kankau, Kuraru, Garambi.

This species is very common in the southern part of Formosa, where it feeds on *Cinnamomum* and *Actinodaphne* also. The specimens, from which the original description was prepared, are incomplete, the thoracic tracheal folds being not discernible. Many good specimens recently collected, however, possess distinct thoracic tracheal pores, and this whitefly must be regarded as a relative of the genus *Dialeurodes*. The thoracic tracheal pores of the pupa case are small, chitinized on the margin, opening at the margin of the pupa case, lacking teeth and located laterad of the 3rd dorsal tubercles of cephalothorax. The thoracic tracheal folds are scarcely discernible, and the distal end of the caudal furrow is nearly similar to the thoracic tracheal pores.

### **Aleurotuberculatus pyracanthae** n. sp.

(Pupa case) Black, white on the lateral areas of abdomen. Oval, broadest at midlength, somewhat indented at the hind end. Mid-thoracic and transverse sutures not eminent, nearly reaching the margin of dorsal disk; abdominal segments distinct on the median area. Submarginal area separated, bent downwards on the outer part, with markings as shown in the figure. Marginal teeth very small, rounded, wider than long; margin with a pair of short setae on the anterior and posterior parts; a pair of very long bristles present at the hind end. Dorsum with many very small chitinized granules more or less pointed and very few minute circular pores, without setae. Cephalothorax with black markings as shown in the figure, which are discernible in specimens treated with potash; abdomen with longitudinal wavy linear markings on the median area and a pair of rounded black parts on the basal segment. Venter with no rim. Thoracic tracheal folds and pores not discernible. Caudal furrow distinct, short, somewhat widened at the base, somewhat thickened on the lateral margins, not forming a distal pore, without markings. Vasiform orifice rather small, wider than long, rounded on the lateral margins, thickened on the margin, with a small, but distinct, notch at the hind end. Operculum wider than long, rounded, nearly filling the orifice. Length of pupa case—about 0.7 mm. Width —about 0.43 mm.

Host.—Pyracantha koidzumii.

Hab.—Taito.

Collected in January 1932. This species is allied to *A. murrayae* SINGH, but differs from it in the colour and in lacking thoracic tracheal clefts. Not a typical species of the genus.



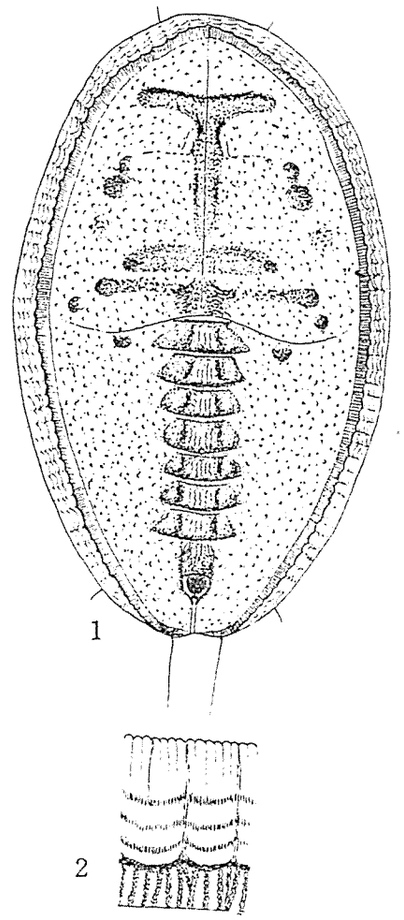


Fig. 7.
*Aleurotuberculatus pyracanthae* n. sp.
(Pupa case)
(1) Outline.
(2) Margin and submarginal area.

### **Aleurothrixus antidesmae** n. sp.

(Pupa case) Pale yellowish white, with many long waxy threads on the whole margin. Elliptic, very slightly indented at the hind end, rounded at the anterior extremity, not constricted, thin. Mid-thoracic suture nearly reaching the margin;

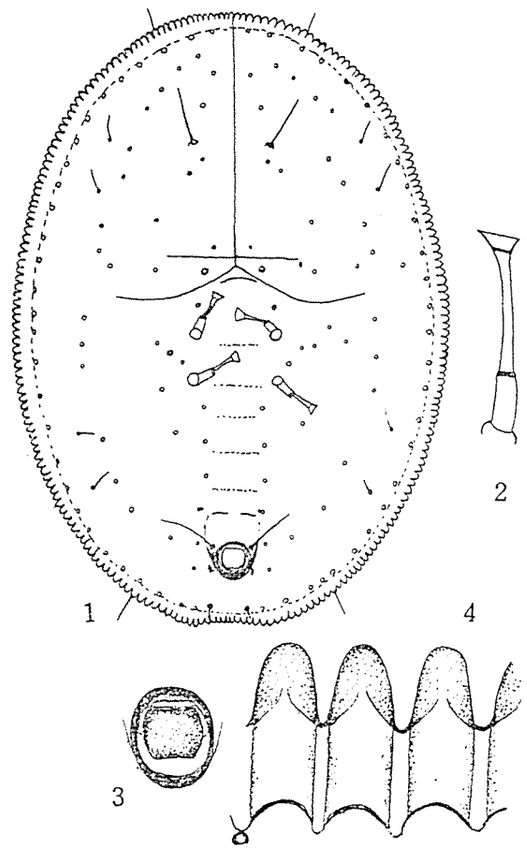


Fig. 8.
*Aleurothrixus antidesmae* n. sp.
(Pupa case)
(1) Outline. (2) Dorsal capitate seta.
(3) Vasiform orifice. (4) Marginal teeth.

transverse one not so; abdominal segments faintly discernible on the median area; metathorax defined on the median part. Dorsum with many small circular pores; cephalothorax with a pair of long setae, and 2 pairs of shorter submarginal setae which are sometimes reaching beyond the margin; abdomen with 2 pairs of peculiar capitate setae on the median area of the basal part, a pair of long setae near the vasiform orifice, a pair of short setae near the hind end, and 2 pairs of submarginal setae; the capitate setae equal in length, stout, as shown in the figure in shape, each arising from a tubercle. Margin chitinized, with a pair of rather long setae on the anterior and posterior parts; teeth arranged in 2 rows, the outer teeth longer than wide, rounded apically, a little widened towards the base; the inner teeth very short, widely rounded, far separated from the outer ones. Thoracic tracheal folds and caudal furrow absent. Vasiform orifice elliptic, longer than wide, thickened on the margin, not notched, located on an elevated part, without teeth. Operculum wider than long, rounded on the lateral margins, nearly straight on the hind margin, occupying more than half the orifice. Lingula not exposed. Antennae rather short. Length of pupa case—about 0.85 mm.

Host.—Antidesma sp.

Hab.—Kuraru near Koshun.

Some specimens were collected by me on May 26, 1932. This species differs



from other species in being provided with peculiar setae on the abdomen.

**Trialeurodes kankoensis** n. sp.

(Pupa case) White. Elliptic, thin, broadest on the basal part of abdomen. Mid-thoracic suture faint on the posterior part, reaching the margin; transverse suture reaching the margin, abdominal segments distinct on the median area. Dorsum with many small circular pores or short rounded papillae sparsely scattered, and 32 long setae arranged in a row along the whole margin, which are equal in length, far reaching beyond the margin and each arising from a small tubercle; the dorsal pores on the submarginal area slightly larger than those on the median area; cephalothorax with 2 pairs of short rounded papillae on the dorsal disk; abdomen with 5 pairs of similar papillae on the dorsal disk, these papillae larger than the submarginal tubercles. Margin a little more chitinized, with many very short small teeth rounded and much shorter than wide. Thoracic tracheal folds and pores not discernible. Caudal furrow very wide, much expanded on the basal half, somewhat thickened on the lateral margins, with markings as shown in the figure. Vasiform orifice subtrapezoidal, small, wider than long, a little narrowed towards the hind margin, a little indented on the hind margin, a little thickened on the lateral margins, without teeth. Operculum much wider than long, broadly rounded on the hind margin, occupying more than half the orifice. Lingula not visible. Length of pupa case—about 0.72 mm. Submarginal seta—about 0.045 mm.

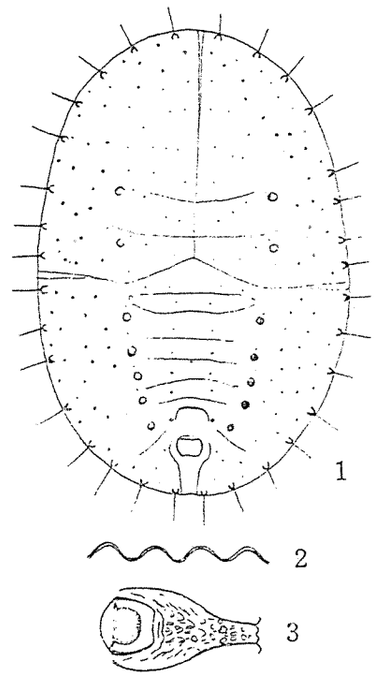


Fig. 9.
*Trialeurodes kankoensis* n. sp.
(Pupa case)
(1) Outline. (2) Margin.
(3) Vasiform orifice and caudal furrow.

Host.—Quercus glauca.

Hab.—Kanko near Shinten, Shinten.

Collected by me in September and October, 1932. Somewhat resembles *Aleyrodes*

*akebiae* Kuw., but differs in the longer submarginal setae, as well as, in possessing a caudal furrow. Also related to *Trialeurodes tricolor* Singh, but differs remarkably.

**Aleurotrachelus rubi** n. sp.

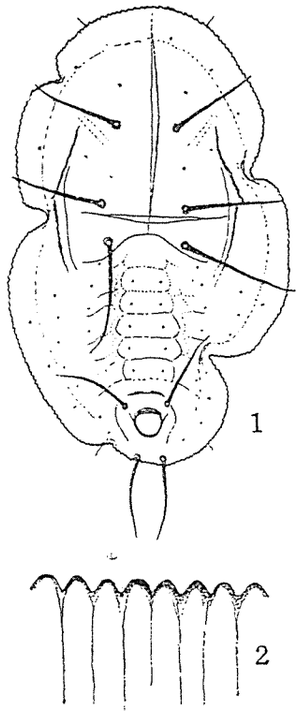


Fig. 10.
*Aleurotrachelus rubi* n. sp.
(Pupa case)
(1) Outline.
(2) Margin and submarginal area.

(Pupa case) White. Elliptic, broadly rounded on the anterior and posterior ends, somewhat convex on the dorsal disk, with an eminent median ridge on the cephalothorax and some irregular eminent indentations on the margin. Cephalothorax with an eminent suture between the meso- and metathoraci; transverse suture broadly curved on the median part, not extending to the mesothorax, reaching nearly the longitudinal folds; abdominal segments distinct on the median area. Dorsum lacking papillae, but with some small circular pores on the abdomen, which are indistinct in some specimens, and with 5 pairs of very long stout bristles of which 3 are on the cephalothorax. Longitudinal folds distinct, without tubercles. Marginal and submarginal areas more chitinized, many indistinct rather large ridges running to the dorsal disk from the margin. Marginal teeth small, in 2 rows difficult to differentiate; the outer teeth wider than long, nearly triangular, rounded at the tip; the inner teeth smaller, more acute; a pair of short setae present on the anterior and posterior margins. Vasiform orifice protruding, large, wider than long, subcordate, rounded on the margin, not notched, without teeth. Operculum nearly filling the orifice, straight on the hind margin. Lingula not visible. Length of pupa case—about 0.65 mm.

Host.—Rubus sp.

Hab.—Shinten, Kagi.

Described from specimens taken on Oct. 16, 1932, at Shinten near Taihoku.

This species is closely allied to *A. longispinus* Corbett, but differs in the shape of the case, in the positions of dorsal bristles, and in the transverse suture not



reaching beyond the longitudinal folds, as well as in other characters.

**Bemisia yanagicola** Kuwana (MS.).

Host.—Salix glandulosa, var. warburgi.

Hab.—Taihoku (Formosa), Foochow (China).

Not uncommon near Taihoku. This species will be described by Dr. I. Kuwana from specimens collected by Prof. C. R. Kellogg at Foochow, China.

**Bemisia hibisci** n. sp.

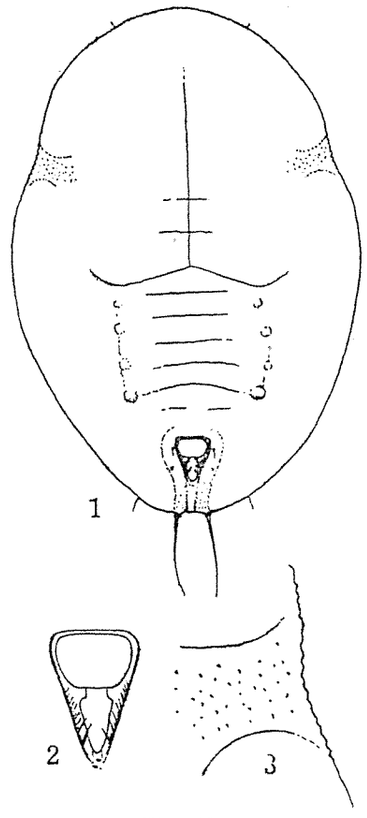


Fig. 11.
*Bemisia hibisci* n. sp.
(Pupa case)
(1) Outline.
(2) Vasiform orifice.
(3) Thoracic tracheal fold.

(Pupa case) White, with no secretion evident. Oval, constricted across the thoracic tracheal folds, thin, a little convex on the dorsal disk. Mid-thoracic and transverse sutures not reaching the margin; basal 6 abdominal segments distinct on the median area. Dorsum with about 4 pairs of short rounded indistinct papillae on the abdomen, wanting distinct setae. Margin with a pair of minute anterior setae, a pair of short latero-posterior setae, and a pair of long stout posterior bristles; the posterior bristles each arising from a small chitinized tubercle; teeth very small, rounded, much wider than long; those of the thoracic tracheal folds distinct. Thoracic tracheal folds very wide, short, with many very small dots, without distinct combs. Caudal furrow shorter than the vasiform orifice, somewhat narrowed posteriorly, lacking markings and a comb. Lobes surrounding the caudal furrow stout, not well defined anteriorly, wider than the furrow, reaching beyond the front margin of the vasiform orifice, with a pair of very short setae near the orifice. Vasiform orifice

triangular, much longer than wide, not well defined at the hind end, with about 8 slender teeth on the lateral margin. Operculum wider than long, rounded on the lateral margins, occupying nearly half the orifice, somewhat narrowed towards the hind margin which is nearly straight or broadly rounded. Lingula not reaching the hind end of the crifice, with a pair of short apical setae. Length of pupa case—about 0.7 mm.

Host.—Hibiscus rosa-sinensis.

Hab.—Taihoku.

Collected by me on Sept. 22, 1931. This species is characterized by the very broad thoracic tracheal folds.

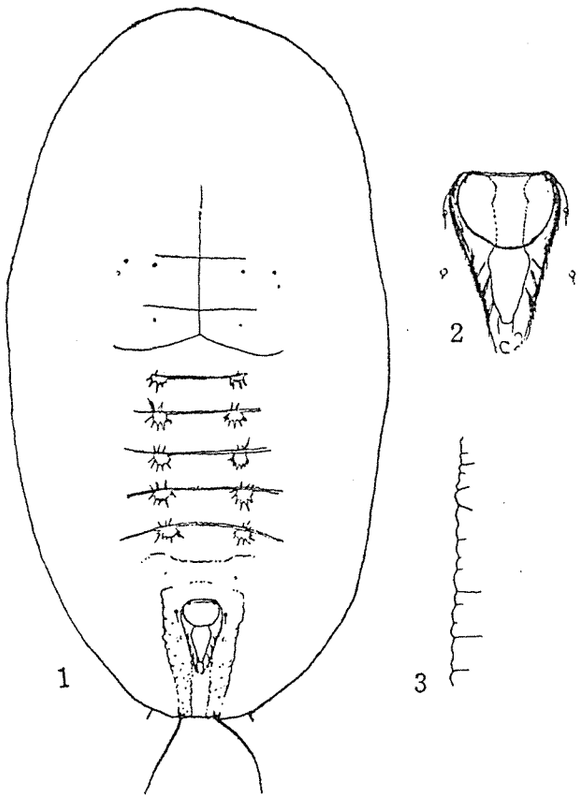


Fig. 12.
*Bemisia formosana* n. sp.
(Pupa case)
(1) Outline. (2) Vasiform orifice. (3) Margin.

**Bemisia formosana** n. sp.

(Pupa case) White, with no secretion evident. Elliptic, elongate, thin. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments distinct on the median area. Dorsum somewhat shrinked, with a few minute circular pores and a short seta laterad of the vasiform orifice; abdominal segments 2-6 with a pair of faint markings on the anterior margin. Margin with a pair of short latero-posterior setae, and a pair of very long stout posterior bristles each arising from a small chitinized tubercle; teeth very small, short, rounded, much wider than long, not chitinized. Thoracic tracheal folds and combs not discernible. Caudal furrow a little shorter than the vasiform orifice, without distinct markings. Lobes surrounding the vasiform orifice stout, not defined anteriorly, somewhat granular, reaching beyond the front margin of the vasiform orifice. Vasiform orifice nearly triangular, much longer than wide, rounded and not well defined on the posterior end, with 3 pairs of slender lateral teeth. Operculum wider than long, rounded on the lateral and posterior margins, a little constricted basally, occupying nearly half the orifice. Lingula not reaching the hind end of the orifice, with a pair of long subapical setae. Length of pupa case—about 1.0 mm.



Host.—A plant of the Gramineae.

Hab.—Kuraru near Koshun.

A single specimen was collected by me on May 25, 1932. This species is allied to *Bemisia giffardi* Kotin., but is different in lacking longitudinal dorsal ridges. Resembles *Aleurocybotus graminicolus* Quaint., differing, however, remarkably in the caudal characters.

**Aleurolobus barodensis** Mask.

*Aleurodes barodensis*, Maskell, Trans. New Zealand Inst., XXVIII, p. 424 (1896) (Not accessible).

*Aleurolobus barodensis*, Quaintance and Baker, Proc. U. S. Nat. Mus., LI, p. 358 (1917); Misra, Rept. Proc. 3rd Ent. Meet. Pusa, 1919, p. 418 (1920); Singh, Mem. Dept. Agr. India, Ent. Ser., XII, p. 74 (1931).

Host.—Miscanthus sp.

Hab.—Taihoku.

Some specimens were collected on Sept. 8, 1932, by Prof. T. Esaki in his second expedition to Formosa where it has not been found on sugar cane. Probably introduced from outside. New to the fauna of Formosa.

**Aleurolobus scolopiae** n. sp.

(Pupa case) Black. Very broad, oval or subcircular, flattened, not pointed at each extremity, not constricted, not indented at the hind end, strongly chitinized. Mid-thoracic and transverse sutures reaching the margin of dorsal disk; abdominal segments distinct on the median area. Submarginal area separated from the dorsal disk except on a small posterior portion, with many markings as shown in the figure.

Dorsal disk narrowly thickened on the margin, wanting eminent setae, but with some minute pores; each abdominal segment with a pair of small oval markings on the anterior margin. Margin more chitinized, lacking setae, with many small very shallow teeth slightly protruding and broadly rounded. Eye spots distinct. Thoracic tracheal folds faintly discernible, without combs. Lobes surrounding the vasiform orifice distinct, normal in shape, reaching the margin. Caudal furrow very narrow, not expanded basally, with a distinct tooth at the hind end. Vasiform orifice triangular, longer than wide, rounded at the hind end, slightly reaching beyond the margin of dorsal disk, lacking teeth, reticulated on the median area. Operculum similar in shape to the orifice, occupying about two-thirds of the orifice. Lingula normal in shape, not reaching beyond the hind end of operculum. Length of pupa case—about 1.25 mm.

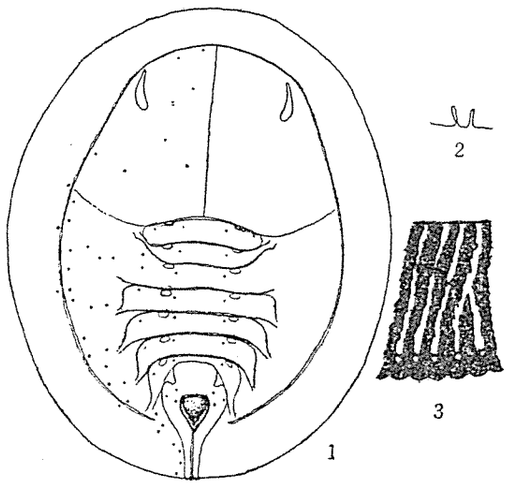


Fig. 13.
*Aleurolobus scolopiae* n. sp.
(Pupa case)
(1) Outline. (2) Comb of caudal furrow.
(3) Marginal teeth and submarginal markings.

Host.—Scolopia oldhami.

Hab.—Garambi near Koshun.

Many specimens were taken by me on May 26, 1932. This species is closely allied to *Aleurolobus taonabae* Kuw., but differs from it in the following characters: (1) Mid-thoracic suture not reaching the margin of pupa case. (2) Dorsal disk not divided into two areas, lacking a submarginal band. (3) Dorsal minut pores more in number. (4) Marginal setae absent.

### **Aleurocanthus eugeniae** n. sp.

(Pupa case) Black, with a white secretion along the margin. Oval, chitinized. Mid-thoracic and transverse sutures not reaching the margin; abdominal segments very faintly discernible on the median area. Dorsum with many short stout spines arranged



mostly in a single row along the margin and a pair of similar ones on the median area of the basal part of abdomen; the spines dark yellowish brown in specimens treated with potash, equal in size, a little constricted about the middle, somewhat expanded on the basal part, more or less pointed apically, with a long process on the distal part; those along the margin a littie reaching beyond the margin. Marginal teeth very small, rounded apically, nearly parallel on the sides, longer than wide. Eye spots small. Thoracic tracheal folds and pores not discernible. Caudal furrow absent. Vasiform orifice located near the hind end, rounded, normal in shape, elevated. Operculum short, taiangular, much wider than long, rounded apically, occupying less than half the orifice. Lingula not exposed. Length of pupa case—about 1.0 mm.

Host.—Eugemia sp.

Hab.—Garambi near Koshun.

Collected by me on May 26, 1932. This species differs from all the known species in the structure and distribution of the dorsal setae. In the younger larva the dorsal setae are longer than those of the pupa case, lacking a process, and are arising from distinct black tubercles.

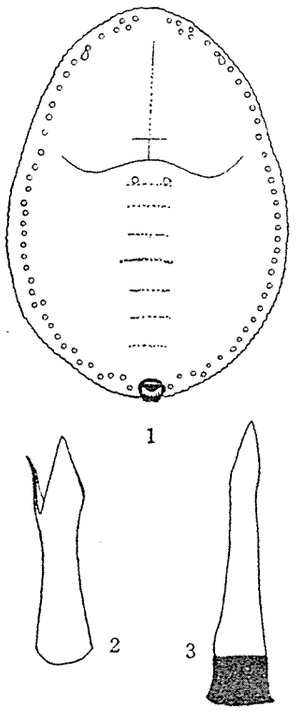


Fig. 14.
*Aleurocanthus eugeniae* n. sp.
(Pupa case)
(1) Outline, showing distribution of dorsal setae.
(2) Dorsal seta.
(3) Dorsal seta of young larva.

## A new aleyrodid infesting mulberry in Loochoo.

In going over a collection of small insects attacking plants, made by Mr. S. Minowa in the summer of 1932 in Loochoo, I found a few interesting specimens of a whitefly on the lower sides of the leaves of mulberry. Upon examination the specimens were found to represent an apparently new species and here is given the description of it.

### **Trialeurodes ishigakiensis** n. sp.

(Pupa case) White. Elliptic, rounded at the front margin, slightly indented at

the hind end, with no distinct ridge on the cephalothorax. Transverse suture not reaching the margin, abdominal segments distinct on the median area. Dorsum with numerous small circular pores a little concaved and densely scattered on the dorsal disk except on the median area; 4 pairs of setae present on the dorsum,* which are variable in length and are sometimes very long and stout (the anterior 3 pairs always not reaching the margin); a short seta laterad of the vasiform orifice; the 3rd–7th abdominal segments each with a median pair of indistinct markings near the anterior margin; submarginal area with peculiar markings as shown in the figure. Thoracic longitudinal folds absent, but a pair of longitudinal rows of more distinct pores present on the cephalothorax. Margin chitinized, with small distinct teeth which are nearly as long as wide, conical, and rounded apically; a pair of short setae present on the anterior and posterior parts of margin. Thoracic tracheal folds distinct in some specimens, lacking dots, not forming a pore or cleft at the distal end. Caudal furrow wanting. Vasiform orifice large, subcordate, as long as wide, rounded on the hind margin, not on an elevated area, not notched, without marginal teeth, but with a pair of minute setae behind the operculum. Operculum tapering, a little constricted basally, as long as wide, rounded apically, filling more than half the orifice. Lingula knobbed, setose, concealed or very slightly exposed. Length of pupa case—about 0.95 mm.

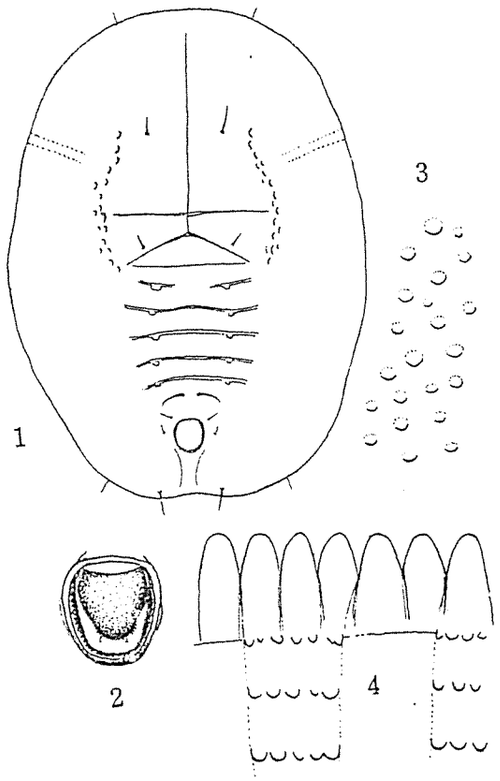


Fig. 15.
*Trialeurodes ishigakiensis* n. sp. ♂
(Pupa case)
(1) Outline. (2) Vasiform orifice. (3) Dorsal pores.
(4) Marginal teeth and submarginal markings.

Host.—Morus alba.

Hab.—Ishigaki, Loochoo.

Collected by Mr. S. MINOWA in July 1932. Not found in Formosa. This species is not a typical *Trialeurodes*, resembling *Aleurotrachelus*, and is characterized by possessing a pair of minute setae in the vasiform orifice, in the presence of more eminent pores in a pair of longitudinal rows on the cephalothorax, and in the markings on the submarginal area.

* Two pairs of the dorsal setae are on the cephalothorax.

# INDEX


| | PAGE |
|---|---|
| Aleurocanthus | |
| eugeniae TAKAH. ... ... ... ... | 20 |
| Aleurolobus | |
| barodensis MASK.... ... ... ... | 19 |
| scolopiae TAKAH.... ... ... ... | 19 |
| Aleurothrixus | |
| antidesmae TAKAH. ... ... ... | 13 |
| Aleurotrachelus | |
| rubi TAKAH.... ... ... ... ... | 16 |
| Aleurotuberculatus | |
| pyracanthae TAKAH. ... ... ... | 12 |
| Bemisia | |
| formosana TAKAH. ... ... ... | 18 |
| hibisci TAKAH. ... ... ... ... | 17 |
| yanagicola KUW. ... ... ... ... | 17 |
| Dialeurodes (Dialeuropora) | |
| viburni TAKAH. ... ... ... ... | 8 |
| Dialeurodes (Gigaleurodes) | |
| formosensis TAKAH. ... ... ... | 9 |
| Dialeurodes (Rabdostigma) | |
| shintenensis TAKAH. ... ... ... | 11 |
| Dialeurodes (Rachisphora) | |
| koshunensis TAKAH. ... ... ... | 6 |
| kuraruensis TAKAH. ... ... ... | 5 |
| reticulata TAKAH.... ... ... ... | 7 |
| Rachisphora ... ... ... ... ... | 6 |
| Trialeurodes | |
| ishigakiensis TAKAH. ... ... ... | 21 |
| kankoensis TAKAH. ... ... ... | 15 |
| Tuberaleyrodes | |
| machili TAKAH. ... ... ... ... | 12 |




# OBSERVATIONS ON THE COCCIDAE OF FORMOSA. III.

By

Ryoichi TAKAHASHI.

## Introduction.

The present contribution is based largely upon specimens recently found on many plants, both cultivated and wild, in Formosa, and a species from Loochoo is also here dealt with.

A number of these insects including some species of considerable economic importance have been added to the fauna of our island by Dr. I. Kuwana and Mr. K. Muramatsu and by me since the publication of the second report, of all of which species is given a list in this paper.

The knowledge of the Formosan Coccidae has been greatly increased in recent years, but there still remain gaps to be fulfilled by future studies, and the results of my further observations will be set forth later.

All the type specimens will be preserved in the Department of Agriculture, Government Research Institute, Formosa.

I express here my sincere thanks to Prof. T. Shiraki, Dr. I. Kuwana and Prof. E. E. Green for their valuable assistance for my work. I am also indebted to Prof. T. Miyake, Mr. J. Sonan and Mr. S. Minowa who have kindly submitted to me interesting materials collected in Formosa or Loochoo.

## Food plant catalogue of the Formosan Coccidae.

(Supplement 2)

Acacia confusa (Leguminosae).

Ferrisiana virgata CKLL.

Acer sp. (Aceraceae).

Chionaspis sozanica TAKAH.

Actinodaphne sp. (Lauraceae).
Aulacaspis yabunikkei Kuw.
Paralecanium expansum Green.
Agalma lutchuense (Araliaceae).
Protopulvinaria agalmae Takah.
Ananas comosus (Bromeliaceae).
Diaspis bromeliae Ker.
Annona muricata (Annonaceae).
Coccus elongatus Signt.
Ferrisiana virgata Ckll.
Pseudococcus filamentosus Ckll.
Saissetia hemisphaerica Targ.
S. oleae Bern.
Annona sp.
Aspidiotus destructor Signt.
Arenga engleri (Palmae).
Fiorinia saprosmae Green.
Asparagus sp. (Liliaceae).
Chrysomphalus aurantii Mask.
Aster lauruleanus (Compositae).
Phenacoccus asteris Takah.
Atalantia lilocularis (Rutaceae).
Chionaspis atalantiae Takah.
Bambusa spp. (Gramineae).
Asterolecanium charmoyi Green.
A. pseudolanceolatum Takah.
Formosaspis formosana Takah.
Tsukushiaspis vermiformis Takah.
Bidens pilosa (Compositae).
Saissetia nigra Nietn.
Bischofia javanica (Euphorbiaceae).
Ferrisiana virgata Ckll.
Phenacaspis dilatata Green.
Bladhia spp. (Myrsinaceae).
Aulacaspis robusta Takah.
Ceroplastes floridensis Comst.
Coccus acuminatus Green.



Lepidosaphes bladhiae Takah.
Saissetia oleae Bern.
Bridelia spp. (Euphorbiaceae).
Chionaspis brideliae Takah.
Pseudococcus lilacinus Ckll.
Calophyllum inophyllum (Guttiferae).
Ferrisiana virgata Ckll.
Capparis membranacea (Capparidaceae).
Saissetia oleae Bern.
Celtis sinensis (Urticaceae).
Aspidiotus cyanophylli Signt.
Cinnamomum camphora (Lauraceae).
Aspidiotus destructor Signt.
Lepidosaphes machili Mask.
C. camphora, var. nominale.
Aulacaspis yabunikkei Kuw.
C. kanehirai.
Aulacaspis yabunikkei Kuw.
Lepidosaphes cinnamomi Takah.
C. reticulatum.
Aulacaspis cinnamomi Newst.
C. sp.
Fiorinia fioriniae Targ.
C. zeylanicum.
Paralecanium expansum Green.
P. machili Takah.
Silvestraspis sinensis Bellio.
Citrus spp. (Rutaceae).
Aspidiotus destructor Signt.
A. lataniae Signt.
Fiorinia proboscidaria Green.
Pseudococcus filamentosus Ckll.
Cocos nucifera (Palmae).
Aspidiotus cyanophylli Signt.
Chrysomphalus rossi Mask.
Codiaeum variegatum (Euphorbiaceae).
Lepidosaphes beckii Newm.

Pseudococcus citri Risso.

Cycas revoluta (Cycadaceae).

Lepidosaphes cycadicola Kuw.

Dendrocalamus latiflorus (Gramineae).

Tsukushiaspis vermiformis Takah.

Diospyros discolor (Ebenaceae).

Icerya aegyptiaca Dougl.

D. kaki.

Pseudococcus citri Risso.

Tachardina theae Green et Mann.

Duranta repens (Verbenaceae).

Pulvinaria durantae Takah.

Elaeocarpus serratus (Elaeocarpaceae).

Coccus mangiferae Green.

Elatostema sp. (Urticaceae).

Pinnaspis aspidistrae Signt.

Epipremnum mirabile (Araceae).

Saissetia hemisphaerica Targ.

Erithryna corallidendron (Leguminosae).

Coccus hesperidum L.

Saissetia oleae Bern.

Eugenia jambos (Myrtaceae).

Fiorinia proboscidaria Green.

Eugenia spp.

Aonidia lahoarei Takah.

Coccus viridis Green.

Eurya sp. (Camelliaceae).

Aspidiotus euryae Takah.

Fiorinia theae Green.

Parlatoria pergandei Comst.

Pinnaspis uniloba Kuw,

Excoecaria orientalis (Euphorbiaceae).

Phenacaspis dilatata Green.

Ficus awkeotsang (Moraceae).

Pseudaonidia trilobitiformis Green.

Ficus beecheyana.

Diaspis major Ckll.



F. foveolata.

Adiscofiorinia ficicola Takah.

Fiorinia formosensis Takah.

Parlatoria crotonis Dougl.

F. nervosa.

Lepidosaphes ficicola Takah.

F. pumila.

Chrysomphalus rossi Mask.

Pseudaonidia trilobitiformis Green.

F. retusa.

Aspidiotus destructor Signt.

Pinnaspis aspidistrae Signt.

F. swinhoei.

Pinnaspis aspidistrae Signt.

Gladiolus gandavensis (Iridaceae).

Saissetia nigra Nietn.

Gelonium aequoreum (Euphorbiaceae).

Chrysomphalus aurantii Mask.

Coccus elongatus Signt.

Pseudococcus filamentosus Ckll.

Glochidion sp. (Euphorbiaceae).

Icerya aegyptiaca Dougl.

Gordonia anomala (Camelliaceae).

Diaspis gordoniae Takah.

Hibiscus matabilis (Malvaceae).

Diaspis pentagona Targ.

Hoya carnosa (Asclepiadaceae).

Aspidiotus excisus Green.

Hydrangea sp. (Saxifiagaceae).

Pseudaonidia trilobitiformis Green.

Illicium anisatum (Magnoliaceae).

Lepidosaphes bladhiae Takah.

Imperata sp. (Gramineae).

Lepidosaphes imperatae Kuw.

Ipomaea batatas (Convolvulaceae).

Ferrisiana virgata Ckll.

Kandelia rheedii (Rhizophoraceae).

Ceroplastes rubens MASK.
Chrysomphalus aonidum L.
Pseudococcus citri RISSO.
Lespedeza sp. (Leguminosae).
Coccus elongatus SIGNT.
Ligustrum japonicum (Oleaceae).
Aspidiotus destructor SIGNT.
Lindera oldhami (Lauraceae).
Aulacaspis yabunikkei KUW.
Liquidambar formosana (Hammamelidaceae).
Tachardina theae Green et MANN.
Lithocarpus sp. (Fagaceae).
Pinnaspis lithocarpi TAKAH.
Luffa cylindrica (Cucurbitaceae).
Pseudococcus citri RISSO.
Maba buxifolia (Ebenaceae).
Saissetia hemisphaerica TARG.
Machilus spp. (Lauraceae)
Aspidiotus machili TAKAH.
Ceroplastes ceriferus AND.
Diaspis machili TAKAH.
Paralecanium machili TAKAH.
Parlatoria machili TAKAH.
P. machilicola TAKAH.
Phenacaspis vitis GREEN.
Pseudaonidia trilobitiformis GREEN.
Maesa sp. (Myrsinaceae).
Aspidiotus cyanophylli SIGNT.
Mangifera indica (Anacardiaceae).
Aspidiotus cyanophylli SIGNT.
A. destructor SIGNT.
Chrysomphalus aonidum L.
C. aurantii MASK.
C. dictyospermi MORG.
Coccus acutissimus GREEN.
Fiorinia fioriniae TARG.
Lepidosaphes bladhiae TAKAH.



Saissetia oleae BERN.
Michelia alba (Magnoliaceae).
Aspidiotus destructor SIGNT.
Phenacaspis dilatata GREEN.
Michelia sp.
Phenacaspis dilatata GREEN.
Miscanthus sp. (Gramineae).
Lepidosaphes sacchari HALL.
Morus sp. (Moraceae).
Eriochiton formosae TAKAH.
Murraya spp. (Rutaceae).
Aulacaspis murrayae TAKAH.
Myristica heterophylla (Myristicaceae).
Fiorinia fioriniae TARG.
Nephelium litchi (Sapindaceae).
Pulvinaria psidii MASK.
Saissetia hemisphaerica TARG.
S. oleae BERN.
Olea europaea (Oleaceae).
Chrysomphalus aonidum L.
Orchidaceae (a species of the).
Lepidosaphes machili MASK.
Oryza sativa (Gramineae).
Trionymus taiwanus TAKAH.
Paederia sp. (Rubiaceae).
Puto spinosa ROBIN.
Pandanus tectorius (Pandanaceae).
Aspidiotus destructor SIGNT.
Parlatoria pergandei COMST.
Paulownia tomentosa (Scrophulariaceae).
Pseudococcus citri RISSO.
Phragmites sp. (Gramineae).
Antonina indica GREEN.
Aspidiotus phragmitis TAKAH.
Chionaspis elongata GREEN.
C. stanotophri COOLEY.
Tsukushiaspis phragmitis TAKAH.

Pinus thunbergii (Coniferae).
Chrysomphalus aurantii MASK.
C. dictyospermi MORG.
Piper sp. (Piperaceae).
Pinnaspis aspidistrae SIGNT.
Pisonia umbellifera (Nyctaginaceae).
Ferrisiana virgata CKLL.
Podocarpus sp. (Podocarpaceae).
Eucalymnatus tesselatus SIGNT.
Psidium guyava (Myrtaceae).
Pseudococcus lilacinus CKLL.
Psychotria elliptica (Rubiaceae).
Aspidiotus destructor SIGNT.
Asterolecanium corallinum TAKAH.
Cerococcus ornatus GREEN.
Pyracantha koidzumii (Rosaceae).
Chrysomphalus tayabanus CKLL.
Quercus glauca (Fagaceae).
Asterolecanium pasaniae KUW.
Fiorinia saprosmae GREEN.
Lepidosaphes glaucae TAKAH.
Neoparlatoria formosana TAKAH.
Rhus semialata (Anacardiaceae).
Aspidiotus excisus GREEN.
Rubus sp. (Rosaceae).
Aulacaspis rosae BOUCHE.
Saccharum officinarum (Gramineae).
Aclerda takahashii KUW.
Coccus takanoi TAKAH.
Pseudococcus boninsis KUW.
Salix sp. (Salicaceae).
Coccus elongatus SIGNT.
Scaevola frutescens (Goodeniaceae).
Chrysomphalus aurantii MASK.
Scolopia oldhami (Flacourtiaceae).
Chrysomphalus aurantii MASK.
Coccus scolopiae TAKAH.



Lepidosaphes pallida GREEN.
Parlatoria pergandei COMST.
Pseudaonidia trilobitiformis GREEN.
Sideroxyron ferrugineum (Sapotaceae).
Coccus viridis GREEN.
Pinnaspis aspidistrae SIGNT.
P. minor MASK.
Saissetia hemisphaerica TARG.
Sideroxyron sp. (Sapotaceae).
Saissetia hemisphaeria TARG.
Sloanea dasycarpa (Elaeocarpaceae).
Saissetia formicarii GREEN.
Smilax spp. (Liliaceae).
Aulacaspis spinosa MASK.
Fiorinia smilaceti TAKAH.
Pinnaspis aspidistrae SIGNT.
Solanum melongena (Solanaceae).
Icerya aegyptiaca DOUGL.
S. tuberosum.
Pseudococcus citri RISSO.
Stauntonia obovatifoliola (Lardizabalaceae).
Aspidiotus stauntoniae TAKAH.
Styrax suberifolium (Styraceae).
Pinnaspis aspidistrae SIGNT.
Tamarix juniperina (Tamaricaceae).
Ferrisiana virgata CKLL.
Pseudococcus citri Risso.
P. filamentosus CKLL.
Tetrapanax papyrifera (Araliaceae).
Saissetia hemisphaerica TARG.
Thea japonica (Camelliaceae).
Aspidiotus cyanophylli SIGNT.
Coccus mangiferae GREEN.
T. sinensis.
Aspidiotus destructor SIGNT.
Thysanolaena maxima (Gramineae).
Aspidiotus phragmitis TAKAH.

Urena lobata (Tiliaceae),

Aspidiotus excisus GREEN.

Viburnum sp. (Caprifoliaceae).

Aspidiotus excisus GREEN.

Vitis sp. (Vitaceae).

Aspidiotus destructor SIGNT.

Coccus elongatus SIGNT.

Lepidosaphes bladhiae TAKAH.

V. vinifera.

Aspidiotus lataniae SIGNT.

Zoisia matrella (Gramineae).

Chionaspis graminis GREEN.

## New or little-known Formosan Coccidae.

### Asterolecanium pseudolanceolatum n. sp.

*Asterolecanium lanceolatum*, TAKAHASHI (in part) (nec. Green), Dept. Agr., Gov't. Res. Inst. Formosa, Rept. no. 48, p. 11 (1930).

(Adult female) Pale yellow. Test narrow, nearly lanceolate, rounded on the anterior end, narrowed on the posterior part, scarcely so on the anterior part, somewhat convex dorsally, with an indistinct median ridge and short incomplete pale brownish fringe, about 1.5 mm. long, about 0·5 mm. wide. Body elongate, tapering on both ends, about 2.4 times as long as wide, about 0.8 mm. in length. Paired-pores distinct, normal in shape, small, equal in size, regularly arranged in a single row along the whole margin except on the posterior small part, absent on the dorsum, a little separated, with no pore between themselves; space between the paired-pores slightly or distinctly shorter than the length of a pair. Very minute setae each arising from a minute tubercle arranged in a single row on the submarginal area along the paired-pores except on the posterior part; the row far separated from the paired-pores, the setae much fewer than the pores, the tubercles smaller than the pores between the spiracles and margin. Tubular ducts straight, slightly broadened towards the base, a little longer than the spiracle, sparsely scattered, about 0.024 mm. in length. Antennae submarginal, larger than a pair of marginal pores, with a short curved seta. Mouth parts large. Spiracles rather stout, much longer than wide, narrowed near the tip, connected with the margin by a series of minute pores which are smaller than the marginal pores, continued along the margin for a short distance



in both directions, and about 15–20 in number in a series. Some minute setae present on the posterior part of abdomen, but cribriform plates wanting. Anal lobes a little protruding, with a long stout apical seta about 0.05 mm. long; 2 short stout setae present on each lobe, of which the mesal one is longer. Anal ring not broadened, chitinized, with 6 stout setae which are reaching the apices of anal lobes, but much shorter than the apical setae. Anal tube a little longer than wide, with a defined narrow transverse chitinized plate on the dorsal margin of the hind end, which is broadly indented on the hind margin, with a small chitinized process on each lateral end; posterior margin of the venter of the tube with a pair of short setae.

Hosts.—Bambusa spp., attacking the stalk and leaf.

Hab.—Taihoku, Heito.

This species is very closely allied to *A. lanceolatum* GREEN, but differs in possessing many distinct paired pores arranged in a single row along the body margin, and differs from *A. charmoyi* GREEN in lacking dorsal paired-pores and in the larger body, as well as, in possessing 2 longer setae on each anal lobe.

### Asterolecanium charmoyi GREEN.

Bull. Ent. Res., XV, p. 45 (1924).

*Asterolecanium pseudomiliaris* GREEN, var. *bambusifoliae*, TAKAHASHI, Dept. Agr., Gov't. Res. Inst., Formosa, Rept. no. 48, p. 11 (1930).

Host.—Bambusa sp.

Hab.—Taihoku, Nisui, Karenko, Shokei near Giran, Riran near Taito.

The Formosan specimens apparently belong to *A. charmoyi* GREEN described from Mauritius, my name sinking as a synonym.

### Coccus scolopiae n. sp.

(Adult female) Yellowish brown or dark yellowish brown, blackish on the median area of dorsum, forming no ovisac, without secretion. Body nearly deltoid, bluntly pointed anteriorly, broadly rounded behind, longer than wide, a little asymmetrical, flattened, slightly convex on the dorsum, hard, but not strongly chitinized, with an eminent λ-shaped dorsal carina not reaching the body margin. Antennae rather short, usually 6-jointed*; the 1st joint much wider than long, with 3 long bristles, of which one is much longer; the 2nd slightly longer than wide, with 2 very long

* In some specimens the 3rd antennal joint is divided and the antennae are 7-jointed; in these specimens the 4th joint is short and not well defined from the 3rd.

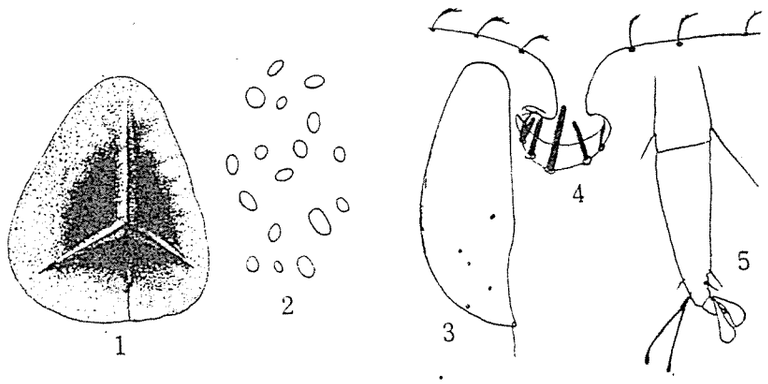


Fig. 16.
*Coccus scolopiae* n. sp.
(Adult female)
(1) Dorsal view. (2) Dorsal cells. (3) Anal plate.
(4) Stigmatic cleft and marginal setae.
(5) Distal part of anterior leg.

bristles; the 3rd long, longer than the distal 3 joints taken together, with 3 long bristles on the distal part, sometimes with a faint trace of division about the middle; the 4th and 5th equal in size, a little longer than wide, each with a long stout seta and a long normal bristle; the 6th rather slender, with some long bristles; the relative length of joints about as follows: I–7, II–10, III–30, IV–6, V–6, VI–10. Eyes located at some distance from the margin, laterad of the antennae. Legs rather small; coxae much longer than wide, lacking pores, with 3 long distal bristles; trochanters faintly defined from the femora, with a very long bristle and some small circular pores at the middle; femora slightly swollen, much longer than the coxae, with 2 long distal bristles; hind femora about 3.5 times as long as wide; tibiae much shorter than the femora, nearly as long as the tarsi, slightly dilated on the distal half, with 2 long distal bristles; hind tibiae about 3.5 times as long as wide; tarsi long, tapering, with 3 setae on the distal part, the digitules very long, rather stout, knobbed; claws with 2 wide digitules expanded towards the tip. Marginal setae short, regularly arranged in a single row, curved on the distal part, slightly fimbriated on the distal part, sometimes slightly expanded on the curved part, equal in length. Marginal tubercles absent. Stigmatic clefts distinct, sunken, widely open, with a distinct very wide chitinized rim; stigmatic spines 5 or 6 in number, arranged in a row, stout, slightly or scarcely curved, rounded apically; the middle one is longer, reaching or not the body margin; the other spines subequal in length, as long as or shorter than the marginal setae. Spiracles expanded on both ends,



wanting pores, but areolated on the basal part, slender on the middle part. Many small circular pores present in a group between the spiracles and clefts. Anal cleft not long, not thickened on the margin. Anal plates much longer than wide, broadly rounded on the outer margin, more or less pointed at the hind end, nearly as in *Coccus bicruciatus* GREEN in shape, about thrice as long wide, broadest behind the middle, rounded at the anterior end, with about 7 short setae on the distal half. Dorsum with many small and rather large oval pores rather densely scattered on the marginal area, which are not distinct in some specimens; some minute setae very sparsely present over the dorsum. Venter with about 2 pairs of transverse groups of some very small multilocular pores between the anal plates and the dorsal transverse ridge, but without pores around the anal plates; a few long bristles present behind the antennae arranged in a transverse row. Tubular ducts absent.

Length of body—about 3.0–3.5 mm. Width of body—about 2.5–2.8mm. Length of antenna—about 0.3 mm. Hind coxa—about 0.13 mm. Hind femur—about 0.17 mm. Hind tibia—about 0.115 mm. Hind tarsus—about 0.1 mm. Anal plate—about 0.14 mm. Marginal seta—about 0.023 mm. Longest stigmatic spine—about 0.037 mm. Tarsal digitule—about 0.05 mm.

Host.—Scolopia oldhami, attacking the leaf.

Hab.—Garambi near Koshun, Shijukei.

Numerous specimens were collected by me in May 1932. This species is apparently closely related to *Coccus bicruciatus* GREEN, but is different from it in the shape of dorsal ridge and in the number of stigmatic spines.

### **Paralecanium machili** n. sp.

(Adult female) Brownish black, somewhat reddish, or entirely black, somewhat shining. Body variable in shape, broadly oval in specimens on *Machilus*, but mostly deltoid, with rounded corners and asymmetrical in specimens on *Cinnamomum*, flattened, not convex, strongly chitinized, with a distinct shallow longitudinal carina not reaching the body margin, and very shallow reticulating uneminent ridges on the sides of the carina as in *Paralecanium geometricum* GREEN, without marginal indentations; venter with a distinct narrow well-defined marginal zone. Antennae slender, 6-jointed, with some long bristles; the 1st joint wider than long; the 2nd slightly longer than wide, with a very long bristle near the tip; the 3rd longest, with a very long subapical bristle; the 4th and 5th subequal in length, longer than wide; the 6th slender; the relative length of joints about as follows: I–6, II–6, III–17, IV–7,

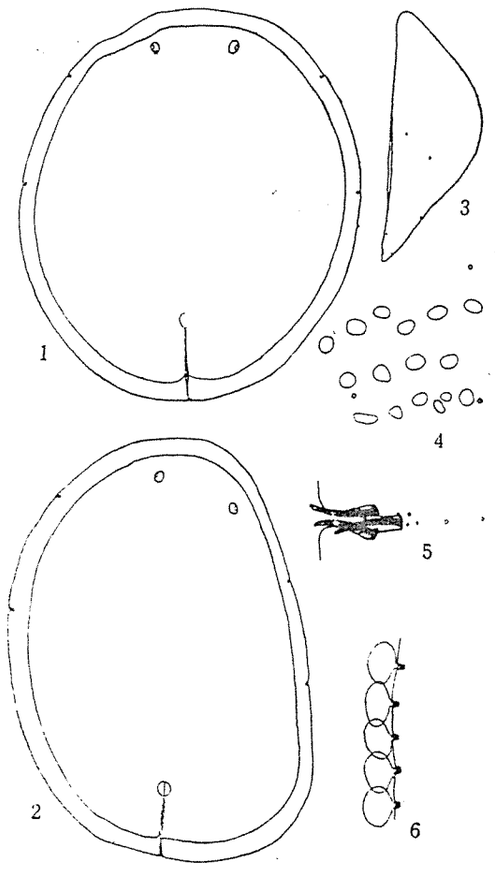


Fig. 17.
*Paralecanium machili* n. sp.
(Adult female)
(1) and (2) Outline of body.
(3) Anal plate. (4) Dorsal cells and pores.
(5) Stigmatic cleft. (6) Marginal flabellae.

V–6, VI–12. Eyes conspicuous, at some distance from the body margin, located antero-laterad of the antennae. Marginal flabellae small, arranged in a single row, a little overlapping, much wider than long, broadest at the middle, oval in shape, faintly striate from the base. Margin scarcely crenate, very slightly protruding at the bases of flabellae. Marginal zone with many translucent narrow waving furrow-like markings running from the body margin. Stigmatic clefts normal, with 3 long stout spines which are rounded apically, slightly or somewhat curved, very slightly narrowed on the basal part, subequal in length, not arranged in a row, reaching or not the body margin. Legs small, but well developed, slender; coxae large, much longer than wide; femora a little swollen, hind femora about thrice as long as wide; tibiae a little narrowed on the basal part, with a slight incision near the tip; hind tibiae about 4 times as long as wide; tarsi tapering, as long as or slightly shorter than the tibiae. Anal cleft short, closed. Anal plates much longer than wide, about thrice as long as wide, widest at the middle, acutely pointed apically, rounded on the outer angle, the basal margin as long as the outer. Anal setae long, reaching beyond the middle of anal plates. Dorsum densely with numerous rather small indistinct oval or circular cells, and much fewer minute circular pores very sparsely scattered. Venter without pores around the anal plates.

Length of body—about 2.6 mm. Width of body—about 2.1 mm. Length of antenna—about 0.24 mm. Hind coxa—about 0.083 mm. Hind femur—about 0.097 mm. Hind tibia—about 0.065 mm. Hind tarsus—about 0.055 mm. Anal plate—about 0.14 mm. Stigmatic spine—about 0.041 mm. Anal cleft—about 0.425 mm. (excluding anal plate). Width of marginal zone—about 0.1 mm. Width of marginal flabella—about 0.032 mm.



Hosts.—Machilus sp., Cinnamomum zeylanicum, attacking the upper side of leaf chiefly along the midrib.

Hab.—Kuraru, Kankau.

Many specimens were collected by me in May 1932. The specimens are so strongly chitinized that the more detailed description can not be prepared. This species is separable from *P. luzonicum* CKLL., by the tarsi slightly shorter than the tibiae, by the wider marginal flabellae, and by the shape of the anal plates, and from *P. ovatum* MORRISON by the longer legs, by the more slender anal plates and by the presence of a dorsal median ridge. Differs also from *P. zonatum* GREEN in the wider flabellae overlapping and in the basal margin of anal plates as long as the outer; and from *P. peradeniyense* GREEN in the shape of anal plates and in the presence of a distinct median carina on the dorsum, as well as, in some other characters.

### **Protopulvinaria agalmae** n. sp.

(Adult female) Pale yellow, with a narrow white secretion along the margin. Body nearly deltoid, broadly rounded posteriorly, narrowing anteriorly, not pointed at the anterior end, nearly as long as or somewhat longer than wide, a little asymmetrical, flattened, thin, not strongly chitinized, lacking ridges, with 4 furrows running mesad from the margin on each side of abdomen; the furrows as long as or shorter than the stigmatic ones. Dorsum more chitinized on the marginal narrow area, with many very short slightly capitate setae very sparsely scattered over the whole surface; the marginal area with some minute circular pores and many small or large, oval or irregular, transparent pores rather densely scattered; these markings not discernible in some specimens. Eyes near the margin, not distinct. Antennae 7-jointed, with some very long bristles; the 1st joint wider than long; the 2nd long, much longer than wide; the 4th sometimes with a trace of division; the 7th with 2 stouter bristles; the relative length of joints about as follows: I–5, II–10, III–10, IV–10, V–6, VI–5. VII–10. Legs rather short; coxae much longer than wide, slightly narrowed basally, with a very long distal bristle; trochanters with a very long bristle; femora slightly swollen, as long as the coxae, about thrice as long as wide,

with 2 long bristles near the tip; tibiae somewhat broadened on the distal part, a little shorter than the femora, about 4.5–5 times as long as wide, about 1.8 times as long as the tarsi, with a few long setae; tarsi narrowed distally, about thrice as long as wide, with 2 very long rather stout capitate digitules which are slightly shorter than the tarsi; claws with 2 very stout digitules expanded distally. Marginal setae very short, equal in length, distinctly fimbriated on the distal part, straight, regularly arranged in a single row; some marginal setae at the hind end longer, simple; some very short simple submarginal setae arranged in a row along the margin, which are much fewer than and nearly as long as o slightly shorter than the marginal setae. Stigmatic clefts small, with 3 spines, of which the middle one is much longer, a little curved, pointed apically, much longer than the marginal setae, reaching beyond the margin; the other 2 spines very short, much longer than wide, pointed apically, much shorter than the marginal setae. About 15–30 small circular pores connecting the spiracles with the margin, which are mostly arranged nearly in a row. Spiracles expanded on both ends, lacking pores, the posterior

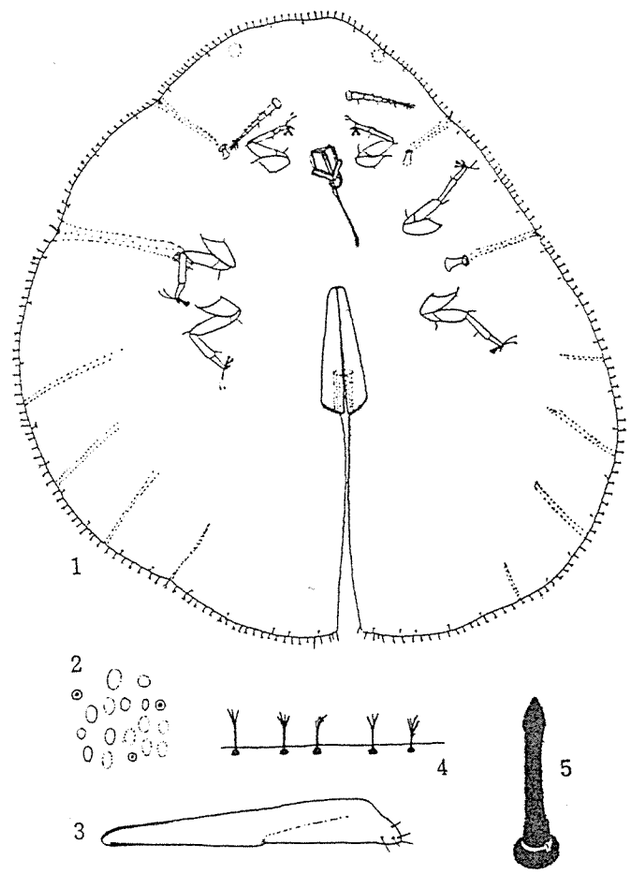


Fig. 18.
*Protopulvinaria agalmae* n. sp.
(Adult female)
(1) Outline. (2) Marginal dorsal pores. (3) Anal plate.
(4) Marginal setae. (5) Dorsal seta.



ones larger. Anal plates very long, narrow, rounded at the anterior end, a little broadened towards the hind end, more or less pointed apically, situated nearly at the center of body, with some short setae on the apical part, the anterior ends reaching the level of insertion of hind coxae. Anal ring under the posterior parts of anal plates, with 6 setae reaching the tips of anal plates. Venter with 3 very long bristles near the base of each antenna, some minute circular pores present in a median group in front of the anal plates, many larger pores in a median group behind the anal plates, and numerous very small slender cylindrical ducts opening over the whole surface.

Length of body—about 2.2 mm. Width of body—about 2.0 mm. Length of antenna—about 0.27 mm. Marginal seta—about 0.018 mm. Longer stigmatic spine —about 0.0323 mm. Anal plate—about 0.49 mm. Dorsal capitate seta—about 0.0095 mm. Hind coxa—about 0.153 mm. Hind tibia—about 0.116 mm. Hind tarsus—about 0.07 mm. Anal cleft—about 0.75 mm. (excluding anal plates).

Hosts.—Agalma lutchuense, Elaeocarpus elliptica.

Hab.—Taihoku, Shinten.

Described from specimens collected on *Agalma* by me on Oct. 16, 1932. Closely allied to *P. longivalvata* GREEN, but differs in the following characters: (1) Body pale yellow. (2) Anterior ends of anal plates at the level of insertion of the hind coxae. (3) Anal ring located under the posterior parts of anal plates, the setae reaching the tips of the plates. (4) Marginal setae much longer than the shorter stigmatic spines.

### **Chionaspis sozanica** n. sp.

(Adult female) (Scale) Very long, narrow, nearly straight, parallel-sided, thin, not convex, about 1.9 mm. in length. Larval skins pale yellowish brown or dark brown; the 1st skin extending beyond the front margin of the 2nd; the 2nd skin broadest at the middle part, narrowed towards both ends, about 1.6 times as long as wide, about 0.55 mm. in length, with 4 pairs of glands on the posterior margin. Secretion occupying most of the scale, white, flattened, not transparent.

(Body) Elongate, parallel-sided or a little widened posteriorly, about twice or thrice as long as wide, about 0.5 mm. long. Antennae widely separated, with a long bristle. Spiracles with some pores in a dense group. The last 3 abdominal segments not protruding laterally, with some small lateral glands; the last 2 segments with 3 short lateral gland spines.

(Pygidium) Wider than long, with many longitudinal lines on the dorsum. Anal opening somewhat transversely oval, nearer to the base than to the tip. Dorsal gland

orifices narrowed, arranged in rows as shown in the figure, about 8–10 in number on each side; the glands large, nearly as large as the marginal ones, much longer than wide. Median lobes eminent, in an incision, somewhat extending out of it, rounded apically, diverging, contigenous on the basal part, scarcely or very slightly serrate, longer than wide, not notched, somewhat dilated at the middle in some specimens. The 2nd lobes distinct, divided; the inner lobules larger, rounded apically, not notched, longer than wide, reaching the apices of the median lobes. The 3rd lobes absent. No setae present between the median lobes. Marginal glands

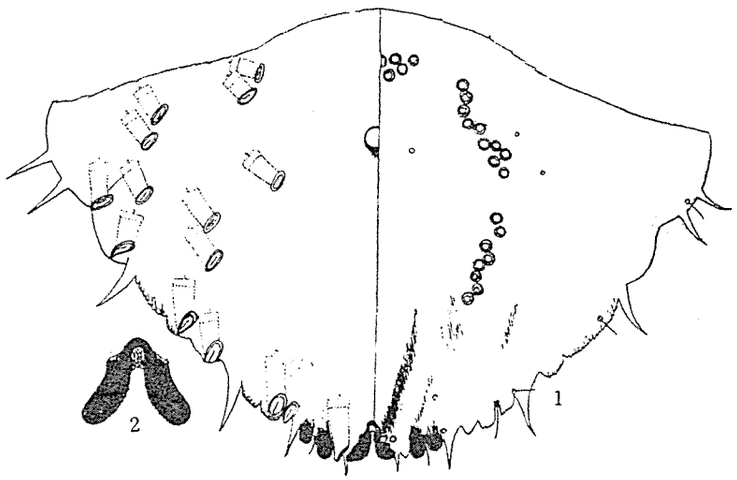


Fig. 19.
*Chionaspis sozanica* n. sp.
(Adult female)
(1) Pygidium. (2) Median lobes.

rather large, 7 on each side. Gland spines longer than the lobes, 6 on each side, the posterior ones shorter. Circumgenital pores in 5 rather loose clusters, the median group with about 8–10 pores, the upper lateral with about 10–12 pores, the lower lateral with about 7–10 pores. Some rather long setae present on the margin.

Host.—Acer sp., attacking the leaf, especially along the ribs.

Hab.—Sozan near Taihoku.

Collected by me on July 3, 1932. The males and females are more numerous on the upper sides of the leaves than on the lower and the latter are found usually along the main ribs and fewer than the former. This coccid seems to be related to *Chionaspis tenera* GREEN, but may be separated from it by the characters of median



lobes. Resembles *Chionaspis strobilanthi* GREEN, differing, however, in the fewer circumgenital pores and dorsal gland orifices, and in some other structures.

### **Chionaspis brideliae** n. sp.

(Adult female) (Scale) White, elongate, narrow, moderately broadened posteriorly, scarcely convex, about 2.0 mm. long. Larval skins pale yellowish brown.

(Body) Elongate, narrow, nearly parallel on the sides, about 2.7 times as long as wide, about 1.35 mm. in length. Antennae with a long curved stout seta, about 0.051 mm. distant from each other. Anterior spiracles slender, expanded on both ends, with about 11 parastigmatic pores in a very dense group; posterior spiracles shorter, wanting pores. Abdominal segments scarcely produced laterally; the last segment* with 3 gland spines, a short lateral gland and some glands in 2 rows on

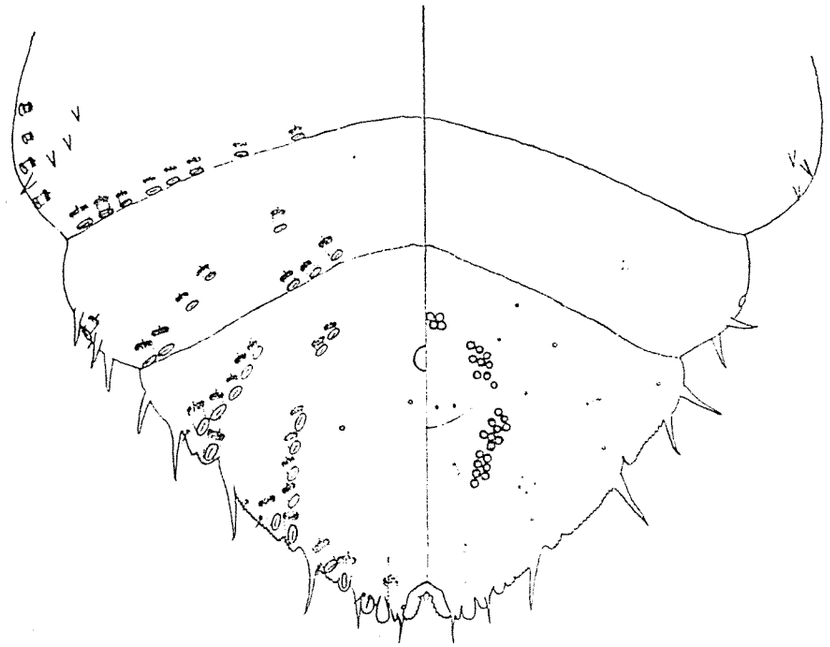

Fig. 20.
*Chionaspis brideliae* n. sp.
(Adult female)
Posterior part of abdomen.

*A segment anterior to the pygidium.

each side; the spines a little shorter than those on the pygidium; the penultimate segment with 4 short gland spines, 4 short lateral glands and some glands arranged in a row on each side; the preceding segment with about 5 short gland spines and 5 or 6 short glands on each side, which are similar to those on the penultimate segment. About 7–10 very short glands present on each side between the anterior and posterior spiracles; about 4–6 small gland spines and 9 very short glands present in a group on each side behind the posterior spiracles.

(Pygidium) Much wider than long, with many longitudinal lines on the dorsum. Anal opening circular, nearer to the base than to the tip. Dorsal gland orifices oval, arranged in 2 rows on each side, about 5 or 6 in number in each row; the glands stout, short, the anterior ones shorter, wider than long. Median lobes in a distinct incision, somewhat extending out of it, united at the base, widely diverging, a little serrate, rounded apically, longer than wide, with a pair of setae between them. The 2nd lobes large, divided; the inner lobules somewhat longer than wide, rounded, not serrate, slightly reaching beyond the apices of median lobes, larger than the outer lobules which are nearly similar in shape to the inner. The 3rd lobes wanting. Marginal glands longer than wide, 6 on eaeh side, of which the posterior one is slender. Gland spines long, 6 on each side, of which the basal 3 or 4 are longer. 5 short marginal setae present on each side. Circumgenital pores in 5 groups; the median group with about 7 pores, the upper lateral with 9–13 pores, the lower lateral with about 16 or 17 pores. Venter with some very small circular pores; 4 minute setae arranged in a transverse row in front of the genital opening.

Host.—Bridelia spp.

Hab.—Shinten, Taihoku.

Described from specimens collected on Sept. 4, 1932. Rather common, but occurring in small numbers. Related to *Chionaspis strobilanthi* GREEN, but differs in the 2nd lobes larger and in the scale more elongate, and may be easily separated from *C. tenera* GREEN by possessing eminent gland spines on the pygidium and also by the 2nd lobes not extending inwards.

### **Chionaspis atalantiae** n. sp.

(Adult female) (Scale) Elongate, moderately dilated behind, broadest about the middle, convex, usually not curved, about 1.5 mm. long. The 1st larval skin pale yellowish brown, at the anterior extremity of the scale. The 2nd skin brownish black or dark yellowish brown, shining, broadest at the middle, about 1.8 times as



long as wide, about 0.67 mm. in length; the pygidium with median lobes nearly similar to those of the adult and 4 pairs of marginal glands. Secretion white, untransparent, occupying most of the scale. Venter closed by a white secretion.

(Body) Elongate, broadest at the middle of abdomen, narrowed towards the front end, brownish black, pale yellowish brown on the pygidium, strongly chitinized except on the posterior part of abdomen, with many rather small indistinct polygonal markings on this chitinized part, many small lateral glands as shown in the figure and some minute slender glands on the median area, about 1.45–1.5 mm. in length. Abdominal segments defined, the last 3 segments protruding laterally, with lateral glands much smaller than the marginal glands on the pygidium; the last segment divided transversely, with 3 or 4 lateral gland spines; the penultimate segment with 3 or 4 lateral gland spines; these 2 segments less chitinized than the pygidium, with a few short glands in transverse rows on the median area. Spiracles in a circular defined area, with no parastigmatic pores discernible.

(Pygidium) Much wider than long, chitinized, but much less so than the anterior part of body, with some longitudinal wavy lines and some oval areolations on the dorsum, the areolations not discernible in the young adult which is not strongly chitinized. Anal opening circular, chitinized on the

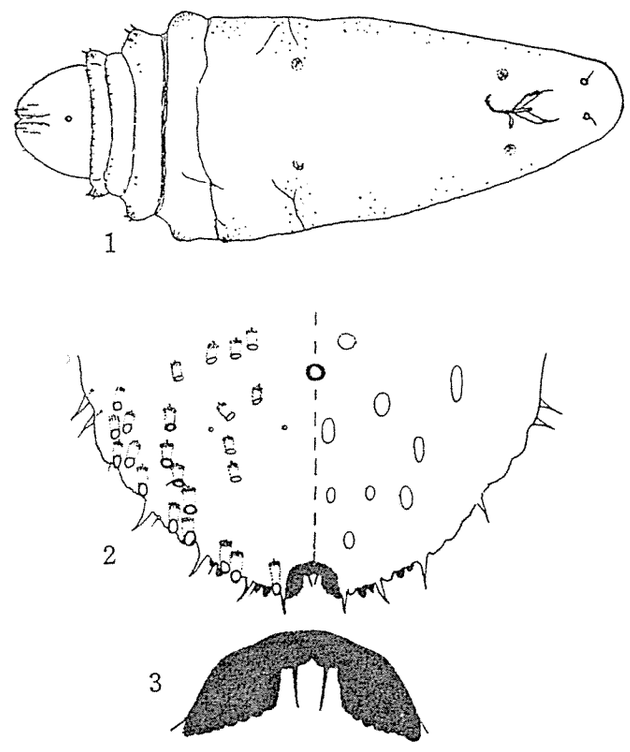


Fig. 21.
*Chionaspis atalantiae* n. sp.
(Adult female)
(1) Outline. (2) Pygidium (dorsal side), right half showing distribution of areolations.
(3) Median lobes.

mergin, much nearer to the base than to the tip, larger than the dorsal gland orifices. Dorsal gland orifices transversely oval, chitinized on the margin, distributed as shown in the figure; the glands short, a little longer than wide, those on the mesal area somewhat smaller. 4 minute pores present in a transverse row behind the anal opening. Median lobes in a distinct incision, slightly protruding out of it, stout, widely diverging, serrate, more or less pointed apically, united at the base, with a pair of setae between them. The 2nd lobes small, divided, the inner lobules rounded apically, reaching the apices of median lobes; the outer lobules smaller, more or less pointed apically. The 3rd lobes smaller than the 2nd, sometimes not distinct. Marginal glands 7 on each side, distributed as shown in the figure. Gland spines longer than the median lobes, equal in length, 6 on each side. Venter with 10 minute setiferous pores on the median area in front of the genital opening and 4 pairs of submarginal similar pores. A pair of long thickenings extending inwards from the median lobes, 2 shorter thickenings present on each side of the median ones. Circumgenital pores wanting. In the old female a rim discernible at the margin of the median incision.

Host.—Atalantia lilocularis, attacking the leaf and branch.

Hab.—Kontei near Koshun.

Collected by me on May 24, 1932. Closely allied to *Chionaspis permutans* GREEN, but differs in the following characters: (1) Scale white, not transparent. (2) Dorsal gland orifices distributed as shown in the figure. (3) Median lobes in an incision.

This species is peculiar in the body strongly chitinized, with areolations discernible on the pygidium, and in lacking circumgenital pores. Somewhat resembles *Chionaspis gynandropsidis* GREEN, but differs in wanting circumgenital pores and in many other characters.

### **Phenacaspis dilatata** GREEN.

Fernald, Cat. Cocc. world, p. 237 (1903); Knwana, Minist. Agr. Forest., Dept. Agr., Sc. Bull., no. 2, p. 5 (1931),

*Phenacaspis eugeniae*, FERRIS (nec. Mask.), Bull. Ent. Res., XII, p. 213 (1921); Takahashi, Dept. Agr., Gov't. Res. Inst.. Formosa, Rept. no. 40 p. 72 (1929).

Hosts.—Michelia spp.,Excoecaria orientalis, Bischofia javanica.

Hab.—Taihoku, Kontei near Koshun.

Mr. E. E. Green has kindly compared the Formosan specimens with the types.



### **Lepidosaphes imperatae** KUWANA.

Dobutsugaku Zasshi (Zool. Mag. Tokyo), XLIII, p. 167 and p. 170, fig. 4 (1931).

Host.—Imperata sp.

Hab.—Taihoku.

New to the fauna of Formosa. This species was regarded as a relative of *Lepidosaphes gloveri* PACK. by KUWANA.. (p. 167), but in my opinion it is very closely allied to *Lepidosaphes intermittens* HALL from Egypt and may be a variety of that species. Differs from the description and figure of Hall's species (Minist. Agr. Egypt., Tech. Sc. Serv., Bull. no. 46, p. 7) in the colour and larger size of the scale, in possessing more gland spines and dorsal gland orifices on the pygidium and in the presence of a short protuberance between the median lobes.

### **Lepidosaphes garambiensis** n. sp.

(Adult female) (Scale) Dark reddish brown or dirty yellowish brown, shining. Elongate, narrow, straight or a little curved, nearly parallel-sided, somewhat convex dorsally, about 2.0 mm. long.

(Body) Long, narrow, a little dilated towards the penultimate segment, a little more than thrice as long as wide, about 0.78 mm. in length, with some small lateral glands on the abdomen. Antennae widely separated, with 2 long very stout curved bristles. Anterior spiracles with a parastigmatic pore. The last 3 abdominal segments distinctly protruding laterally, with some short lateral glands, some small glands on the median area, 2 lateral gland spines and a lateral seta, but laching chitinized spurs; the lateral glands on the last segment larger, nearly as large as the dorsal glands on the pygidium; the gland spines on the anterior segment shorter.

(Pygidium) A little wider than long, with many longitudinal lines on the dorsum, nearly straight on the hind margin. Anal opening large, a little wider than long, near the base. Dorsal gland orifices narrowed, arranged in 3 rows and about 11 on each side; the glands stout, short, wider than long. Marginal glands very large, long, 6 on each side, of which the posterior one is a little smaller, distinctly protruding. Short and very small denticles present on the lateral margins of the posterior half. Median and 2nd lobes large, rounded apically, not serrate, arranged in a straight row, parallel, extending inwards; median lobes stout, somewhat longer than wide, usually with a slight notch on each side; the 2nd lobes divided; the inner lobules large, slightly narrowed at the base, a little smaller than the median lobes,

usually not notched, stout; the outer lobules much smaller, slender, much longer than wide. The 3rd lobes absent. A pair of spines between the median lobes reaching the apices of median lobes. Gland spines rather short, 4 on each lateral margin.

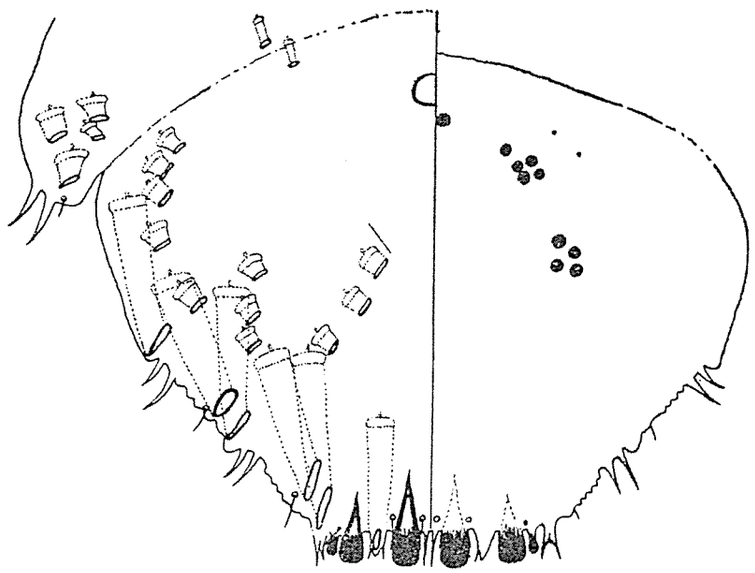

Fig. 22.
*Lepidosaphes garambiensis* n. sp.
Pygidium of adult female.

Circumgenital pores in 5 loose clusters; the median group with 2 pores, the upper lateral with 4 or 5 pores, the lower lateral with 4 pores.

Host.—A shrub not determined.

Hab.—Garambi near Koshun.

Collected by me on May 26, 1932. This species is characterized by the very long marginal glands on the pygidium, and may be easily distinguished from *Lepidosaphes lasianthi* GREEN by the shape of the median lobes, to which this new species seems to be related.

### **Lepidosaphes cinnamomi** n. sp.

(Adult female) (Scale) Pale yellowish brown, shining. Elongate, expanded posteriorly, moderately convex dorsally, slightly curved, lacking a ridge, membraneous and pale brownish on the lateral and posterior marginal areas, about 2 mm. long. The lst skin a little extending beyond the front margin of the 2nd. The 2nd skin wide,



about 1.8 times as long as wide, about 0.7 mm. in length, with 4 pairs of marginal glands on the pygidium.

(Body) Elongate, somewhat broadened towards the hind part, about 1.05 mm. in length. Head with a small, but distinct, spine on each side, which is sharply pointed, directed forewards and longer than wide. Antennae very widely separated, with 2 long curved stout bristles. Anterior spiracles with 3 or 4 parastigmatic pores, posterior spiracles wanting them. Many short slender ducts present on the lateral areas from behind the mouth parts to the posterior part of abdomen. The last 3 abdominal segments distinctly protruding laterally, each with a chitinized lateral spur; the last segment with 3 or 4 gland spines; the penultimate segment with 4 gland spines and about 7 short conical spines on each side; the preceding segment with 1 or 2 gland spines and about 7 similar conical spines on each side; these conical spines smaller than the spurs.

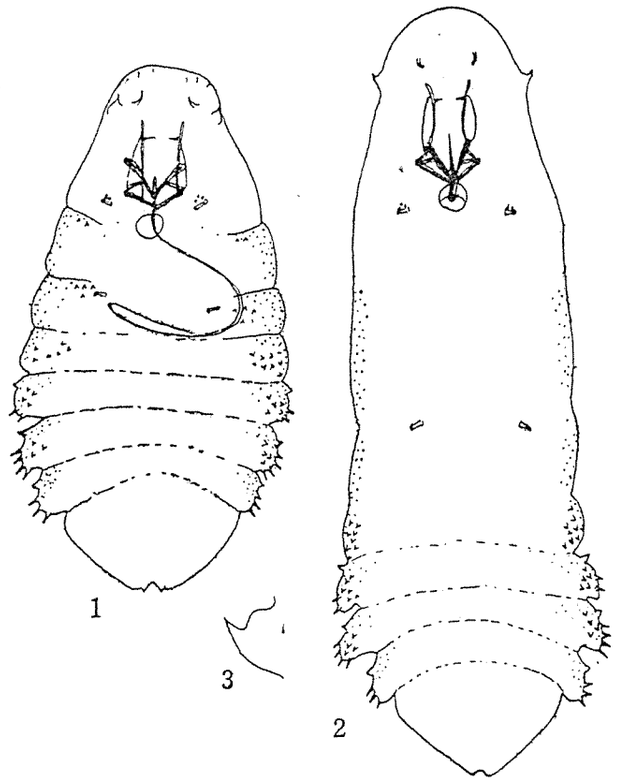


Fig. 23.
*Lepidosaphes cinnamomi* n. sp.
(Adult female)
(1)—(2) Body.
(3) Lateral spine on head.

(Pygidium) Wider than long, nearly straight on the hind margin. Anal opening transversely oval, near the base. Dorsal gland orifices small, circular, much smaller than the circumgenital pores, about 20 arranged in about 4 rows on each side; the glands slender, moderate in length. Marginal glands stout, longer than wide, 5 on each side. Median lobes eminent, nearly as long as wide, notched on each side, not

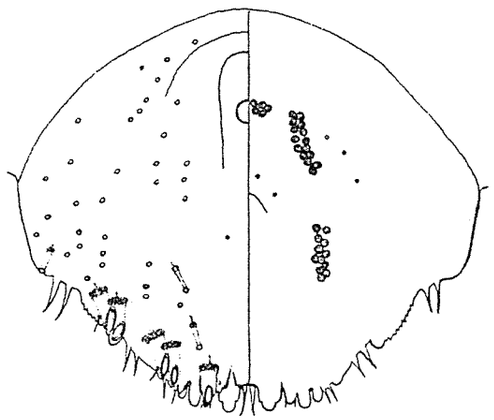

Fig. 24.
*Lepidosaphes cinnamomi* n. sp.
Pygidium of adult female.

serrate, rounded apically, parallel, slightly sunken. The 2nd lobes divided, the inner lobules much smaller than the median lobes, rounded, somewhat longer than wide, the outer lobules a little smaller than the inner. Gland spines long, about 7 on each side; a pair between the median lobes slightly longer than the lobes. Circumgenital pores in 5 groups, the median group with about 7 pores, the upper lateral group with about 9–12 pores; the lower lateral with about 6–9 pores.

Host.—Cinnamomum kanehirai.

Hab.—Kanko near Shinten.

Some specimens were taken by me on Sept. 5, 1932. This species is characterized by possessing a lateral spine on the cephalothorax. Somewhat resembles *Lepidosaphes pallida* GREEN in the colour of the scale, but the scale is widened posteriorly in this new species.

### **Fiorinia proboscidaria** GREEN.

Jl. Bombay Nat. Hist. Soc., XIII, p. 256, Pl. G, figs. 29–32 (1900); Fernald, Cat. Cocc. World, p. 248 (1903); KUWANA, Yengei no Kenkyu, no. 26, Reprint, p. 1 (1931).

Host.—Citrus poonensis, Eugenia jambos.

Hab.—Inrin, Kagi.

Previously known from Ceylon and Loochoo.

### **Fiorinia formosensis** n. sp.

(Adult female) (Scale) Brownish yellow or pale yellow, shining. The 1st skin a little extending beyond the 2nd. The 2nd skin elongate, nearly parallel on the sides, or somewhat narrowed posteriorly, about 2.4 times as long as wide, breadly rounded on the front margin, straight or somewhat curved, lacking eminent spines, about 1.25 mm. long, with an indistinct median ridge; the pygidium with 5 pairs of



marginal glands.

(Body) Wide, nearly as in *Fiorinia fioriniae* TARG. in shape, with a few small conical lateral processes, about 0.5 mm. long. Head with a small conical process between the antennae, which is longer than wide, pointed apically, shorter than the antennal bristles, variable in length, with a very small lateral process near the tip on each side. Antennae rather closely placed, very small, with a long curved bristle, but lacking processes. Anterior spiracles with 2–4 parastigmatic pores, posterior spiracles without them. The last abdominal segment with a gland spine and a lateral gland which is as large as the marginal glands on the pygidium, the penultimate segment with 2 similar spines, the preceding segment with 3 or 4 similar ones.

(Pygidium) Wider than long. Anal opening transversely oval, nearer to the base than to the tip. Marginal glands distinct, longer than wide, 4 on each side. Median lobes distinctly serrate, slightly extending out of the incision, diverging, longer than wide, with a pair of short setae between them; the 2nd lobes divided, small; the inner lobules somewhat longer than wide, notched on the side, rounded

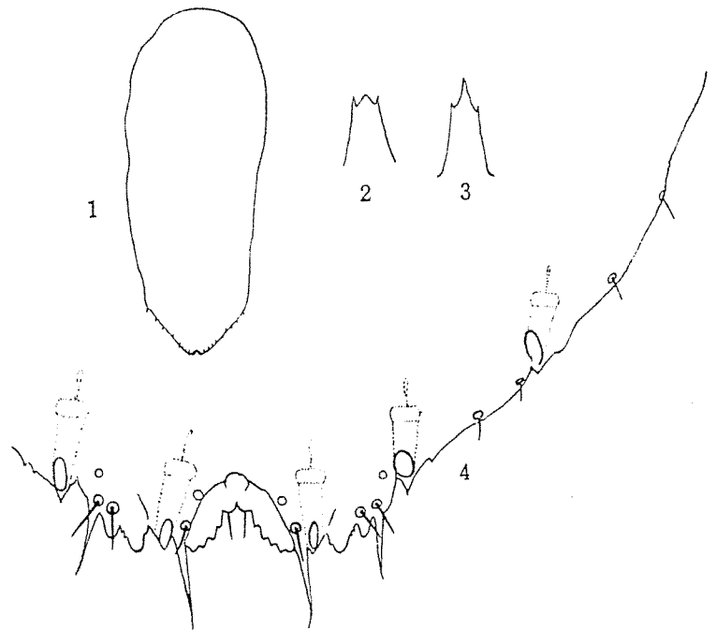


Fig. 25.
*Fiorinia formosensis* n. sp.
(Adult female)
(1) 2nd larval skin. (2) (3) Frontal process between antennae.
(4) Marginal area of pygidium.

apically, the outer lobules smaller, not notched, longer than wide, nearly conical, rounded or more or less pointed apically. Gland spines slender, very long, much longer than the median lobes, 2 on each side. About 6 rather long marginal setae present on each side. About 8 very slender short filiform ducts present on the submarginal area of each side. Circumgenital pores in 5 groups, the median group with about 3–5 pores in a straight row, the upper lateral with about 10 pores, the lower lateral with about 15–19 pores. 4 very small circular pores present near the anal opening.

Host.—Ficus sp.

Hab.—Shinten.

Many specimens were collected by me on Sept. 5, 1932. This species is related to *Fiorinia fioriniae* Targ., but differs in the following characters: (1) Head with a process between the antennae. (2) Antennae without a long projection. (3) Median lobes wider. (4) Pygidium with very long gland spines on the posterior part.

Distinguished from *Fiorinia euryae* Kuw. by the number of marginal glands on the pygidium, by the eminently serrated median lobes, and by the more slender 2nd skin, as well as by the presence of the 2nd lobes.

### **Silvestraspis sinensis** Bellio.

Boll. Lab. Zool. Portici, XXII, p. 160 (1929).

Host.—Cinnamomum zeylanicum.

Hab.—Kuraru near Koshun.

An Adult female was taken by me on May 25, 1932, which agrees well with the original description and figures. Previously recorded from an unknown plant in China.

### **Parlatoria machilicola** n. sp.

(Adult female) (Scale) Oval, a little dilated behind, broadest behind the middle, broadly rounded on the hind margin, about 1.25 mm. in length (in some specimens elongate, broadest about the middle). The 1st skin pale, nearly circular, shorter than half the 2nd, at the anterior end of the 2nd. The 2nd skin broadly oval, broadly rounded on the hind margin, about 1.4 times as long as wide, a little protruding at the median part of the hind margin, black except on the lateral marginal areas dark brown, about 0.65 mm. in length; median lobes and fimbriated plates between lobes nearly as in the adult, the 2nd and 3rd lobes conical, pointed apically,



notched on the outer edge; 6 pairs of small glands present on the hind margin. Secretion pale or dark brown, a little extending out of the lateral margins of the 2nd skin.

(Body) Broadly oval, a little longer than wide, about 0.42 mm. long, with some short setae along the margin and some small glands on the lateral margins of abdomen. Eyes prominent, large, circular, larger than the anal opening, at some distance from the margin, laterad of the anterior spiracles. Antennae with a very long bristle. Spiracles without parastigmatic pores discernible. The last 3 abdominal segments with 2 lateral processes similar to those on the basal part of pygidium.

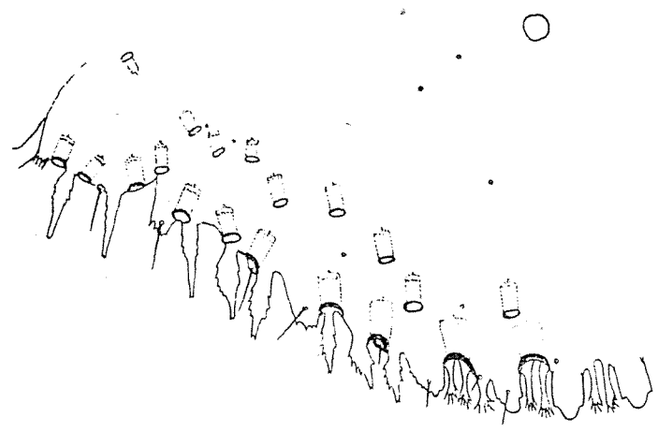

Fig. 26.
*Parlatoria machilicola* n. sp.
Pygidium of adult female (dorsal view of left half).

(Pygidium) Much wider than long. Anal opening circular, larger than the dorsal gland orifices, nearly at the center, Dorsal gland orifices transversely oval, about 10 on each side, distributed only on the submarginal area as shown in the figure; the glands smaller than the marginal ones, longer than wide. Marginal glands short, a little longer than wide, somewhat shorter than the median lobes, absent between the median lobes, about 10 on each side, the basal ones smaller. 3 pairs of lobes eminent; median lobes much longer than wide, larger than the 2nd, rounded apically, nearly straight or slightly rounded on the sides, notched on each side, somewhat diverging. The 2nd lobes nearly as large as the 3rd, rounded or truncate apically, once notched on the mesal side, twice so on the outer side, nearly as long as the median lobes. The 3rd lobes rounded of slightly serrate on the outer side, more or less pointed apically. 2 slender fimbriated plates present between the median lobes, 2 between the median and 2nd lobes, 3 between the 2nd and 3rd lobes, these plates fimbriated on the distal part, somewhat dilated on the distal part, equal in length, as long as the median lobes. 3 short wide fimbriated plates present outside of the 3rd lobes; about 8 long slender processes a little fimbriated present ontside of the 3rd lobes; these slender

processes mostly a little dilated at the middle part, narrowed basally. Some long marginal setae present on each side. Circumgenital pores in 4 groups, the upper group with about 10 pores, the lower with about 9 pores.

Host.—Machilus spp.

Hab.—Kuraru near Koshun.

Collected on May 25, 1932. Near to *Parlatoria itabicola* Kuw. and *P. machili* Takah., especially to the former, but differs from them in the characters of pygidium. Common at Kuraru, being found in loose clusters or singly on the lower surface of the leaves.

### **Aspidiotus phragmitis** Takah.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 4 (1931).

*Aspidiotus miscanthi* Kuwana, Dobutsugaku Zasshi (Zool. Mag. Tokyo), XLIII, p. 169 (1931).

Hosts.—Phragmites sp., Thysanolaena maxima.

Hab.—Suo, Daichikko near Daibu, Taihoku, Shinten, Amamioshima (Loochoo).

The 2nd lobes are variable in shape and size, and the fimbriated plates are usually absent outside of the 3rd lobes which are not discernible in some specimens. The circumgenital pores are wanting in specimens collected at suo and Daichikko, but are present in 4 groups in specimens collected at Taihoku as follows: 3–5 pores in the upper group and 3 or 4 in the lower group. Kuwana's species from Loochoo is a synonym of this species.

### **Aspidiotus stauntoniae** n. sp.

(Adult female) (Scale) Gray, semi-transparent, thin, flattened, nearly circular, but irregular on the margin, about 1.5 mm. in diameter.

(Body) Yellow when alive, with some very short marginal and submarginal setae and some very small thin tubular ducts on the submarginal areas, about 1.15 mm. in length. Antennae with a long curved seta, about 0.083 mm. distant from each other. Spiracles without parastigmatic pores. Abdomen with about 15 distinct tubular ducts on the posterior part of each side, the segments distinct except on the lateral areas, not produced laterally.

(Pygidium) Wider than long. Anal opening behind the center, longitudinally oval. Dorsal gland orifices transversely oval, not arranged in regular rows, about 25–30 on each side; the ducts long, slender, but not filiform, some of them reaching nearly the basal margin, but not beyond it. Median lobes distinctly longer than



wide, broadly rounded on the distal margin, notched on each side, nearly parallel. The 2nd lobes smaller and more slender than the median, notched only on the outer side. The 3rd lobes similar in shape to, but somewhat smaller than, the 2nd. Fimbriated plates nearly as long as the median lobes, 2 between the median lobes, 2 between the median and 2nd, 3 between the 2nd and 3rd, 8 beyond the 3rd. A few short lateral tubular ducts present on the basal part which is sometimes a little protruding laterally, An eminent stout spine arising from near the base of each of the 2nd and 3rd lobes, the spines sharply pointed, shorter than the lobes. Venter with some chitinized parts near the base.

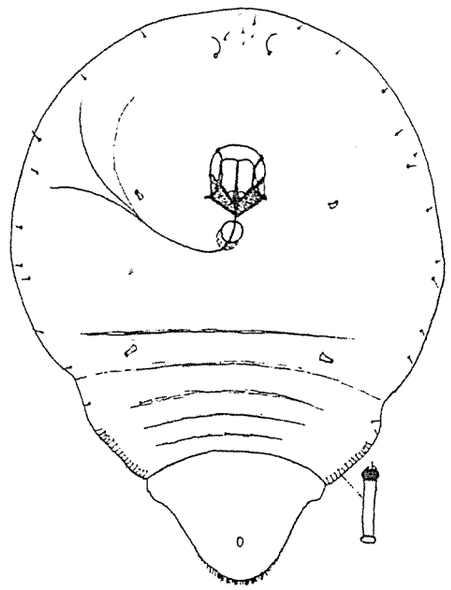

Fig. 27.
*Aspidiotus stauntoniae* n. sp.
Adult female.

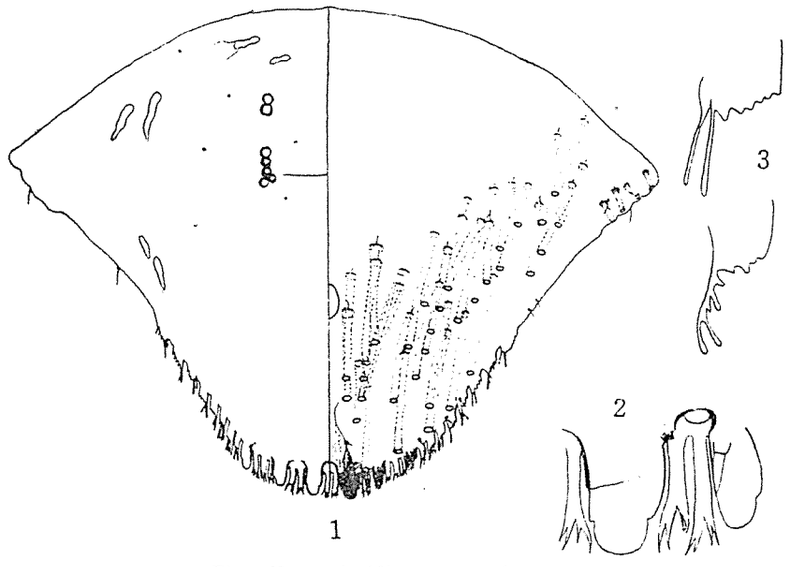


Fig. 28. *Aspidiotus stauntoniae* n. sp.
(Adult female)
(1) Pygidium. (2) Median and 2nd lobes and fimbriated plates. (3) Fimbriated plates.

Circumgenital pores in 4 groups, the upper group with 1 or 2 pores, the lower with 4 or 5 pores in a longitudinal row.

Host.—Stauntonia obovatifoliola.

Hab.—Shinten.

Some females were taken by me on Oct. 16, 1932. This species is characterized by possessing eminent lateral glands on the abdomen. Near to *Aspidiotus destructor* SIGNT.

### Chrysomphalus tayabanus CKLL.

*Aspidiotus tayabanus*, COCKERELL, Proc. Davenport Acad. Sc. Iowa, X, p. 133 (1905); ROBINSON, Philippine Jl. Sc., XII, D, p. 32 (1917).

Host.—Pyracantha koidzumi.

Hab.—Taito.

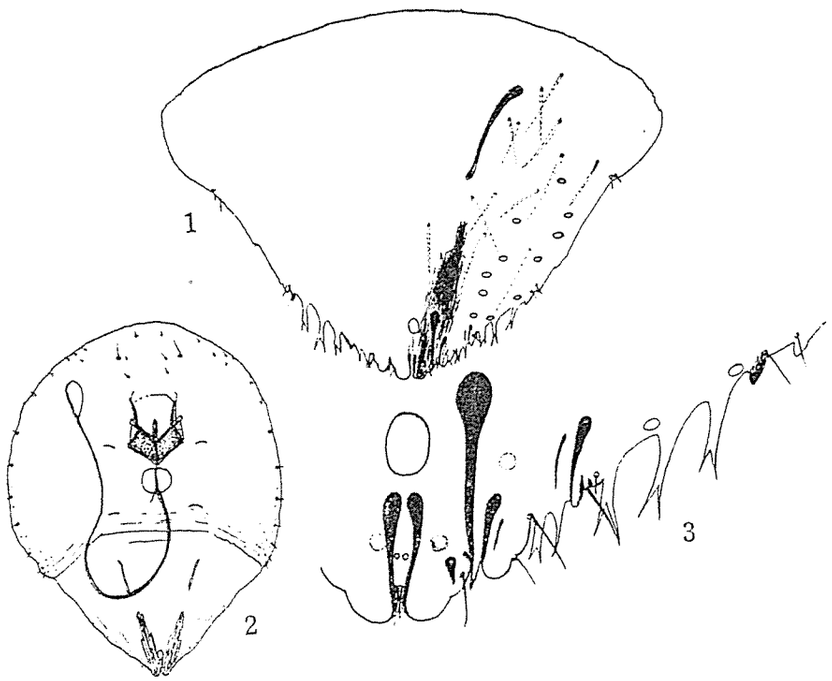


Fig. 29.
*Chrysomphalus tayabanus* CKLL.
(Adult female)
(1) Pygidium. (2) Body. (3) Margin of pygidium.



Previously known only from the Philippines. A few specimens were collected by me on Nov. 21, 1930.

## A new species of Chrysomphalus from Loochoo.

### Chrysomphalus sotetsu n. sp.

(Scale) Pale brown, semi-transparent, thin, nearly circular, about 1.3 mm. in diameter.

(Body) Cephalothorax and basal part of abdomen with about 30 rather long marginal and submarginal setae, body about 1.05–1.1 mm. long. Antennae widely separated, with a very long bristle. Spiracles with no parastigmatic pores. Abdomen not sunken, with about 6 ducts on each side, the last 2 segments distinctly produced laterally, with 2 lateral setae; the penultimate segment with a duct on each side.

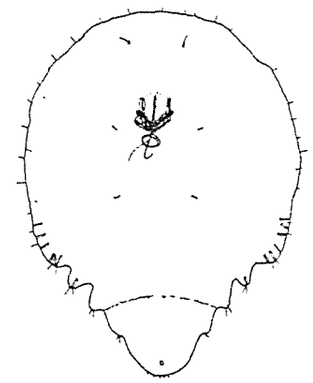

Fig. 30.
*Chrysomphalus sotetsu* n. sp.
Adult female.

(Pygidium) Wider than long, with 2 long lateral setae on the hind end of the basal produced part. Anal opening oval, a little nearer to the hind end than to the genital opening. Dorsal gland orifices small, transversely oval, about 15–17 on each side, not arranged in regular rows; the ducts slender, very long, a few of them usually reaching a little beyond the base of pygidium. About 10 short very thin filiform ducts present on the submarginal area of each side. Paraphyses short, 5 on each side. Median lobes longer than wide, broadly rounded distally, notched on each side, more distinctly so on the outer side, somewhat larger than the 2nd, parallel. The 2nd lobes similar in shape to the median. The 3rd lobes slightly smaller than the 2nd, scarcely notched on each side. Fimbriated plates slender, as long as the median lobes, 2 between the median lobes, 2 between the median and 2nd, 3 between the 2nd and 3rd, 3 outside of the 3rd. Venter with 2 pairs of longitudinal chitinized parts and a few very small circular pores as shown in the figure. Circumgenital pores wanting.

Host.—Cycas revoluta, Ficus retusa.

Hab.—Ishigaki, Miyako.

Some specimens were collected by Mr. S. Yasukawa on *Cycas* from Ishigaki and a specimen by Mr. S. MINOWA on *Ficus* at Miyako. This species is character-

ized by the abdominal segments eminently projecting laterally. Not yet found in Formosa.

In this connection it is added that *Aspidiotus makii* Kuw. described from Amamioshima is also found on *Pinus* at Ishigaki.

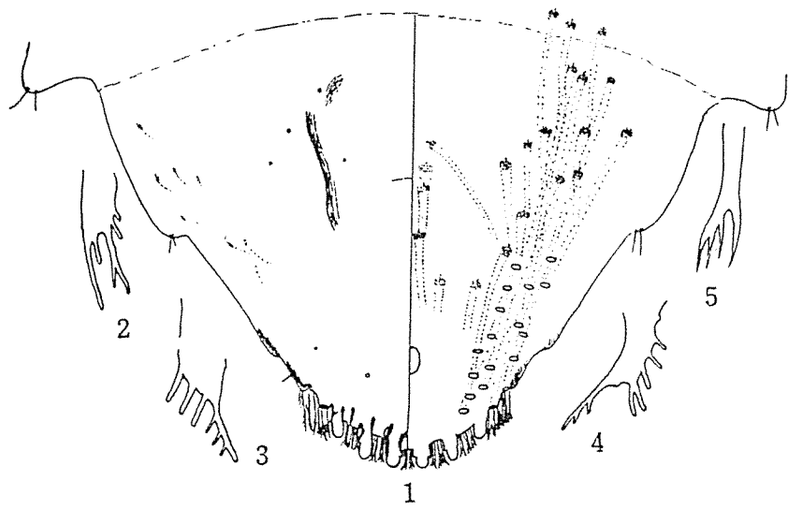


Fig. 31.
*Chrysomphalus sotetsu* n. sp.
(Adult female)
(1) Pygidium. (2)-(4) Fimbriated plate outside of last lobe.
(5) Fimbriated plate between median lobes.

## List of species recorded from Formosa since the publication of the part II.*

(1) Pseudococcus boninsis Kuw.
TAKAHASHI, Jl. Soc. Trop. Agr., Formosa, IV, p. 41 (1932).
Host.—Sccharum officinarum.
Hab.—Taihoku.

(2) Trionymus taiwanus TAKAH.
Jl. Soc. Trop. Agr., Formosa, IV, p. 41 (1932).
Host.—Oryza sativa,
Hab.—Taihoku.

* Dept. Agr., Gov't. Res. Inst., Formosa, Rept. no. 48 (1930).



(3) Phenacoccus asteris TAKAH.
Jl. Soc. Trop. Agr., Formosa, IV, p. 43 (1932).
Host.—Aster lauruleanus.
Hab.—Taihoku.

(4) Aclerda takahashii Kuw.
Oyo-Dobuts. Zasshi, III, p. 231 (1931); Philippine Jl. Soc., XLVIII, p. 62 (1932).
Host.—Saccharum officinarum.
Hab.—Taihoku, Kori, Shinka.

(5) Cerococcus ornatus GREEN.
TAKAHASHI, Jl. Soc. Trop. Agr. Formosa, III, p. 385 (1931).
Host.—Psychotria elliptica.
Hab.—Taihoku, Hokuto.

(6) Coccus takanoi TAKAH.
Jl. Soc. Trop. Agr., Formosa, IV, p. 45 (1932).
Host.—Saccharum officinarum.
Hab.—Shinka.

(7) Pulvinaria durantae TAKAH.
Trans. Nat. Hist. Soc. Formosa, XXI, p. 1 (1931).
Host.—Duranta repens.
Hab.—Taihoku, Kagi.

(8) Aulacaspis robusta TAKAH.
Bull. Ent. Res., XXII, p. 212 (1931).
Host.—Bladhia sieboldii.
Hab.—Shirin, Taihoku.

(9) Aulacaspis murrayae TAKAH.
Bull. Ent. Res., XXII, p. 212 (1931).
Hosts.—Murraya spp.
Hab.—Taihoku, Shinten, Toyen, Takao, Heito, Garambi, Kuraru, Chippon, Taito.

(10) Aulacaspis cinnamomi NEWST.
TAKAHASHI, Jl. Soc. Trop. Agr., Formosa, III, p. 377 (1931).
Host.—Cinnamomum reticulatum.
Hab.—Garambi, Kuraru, Kankau.

(11) Aulacaspis spinosa MASK.
TAKAHASHI, Jl. Soc. Trop. Agr., Formosa, III, p. 377 (1931).
Host.—Smilax sp.

Hab.—Taiheizan.

(12) Diaspis gordoniae TAKAH.

Bull. Ent. Res., XXII, p. 211 (1931).

Host.—Gordonia anomala.

Hab.—Taihoku.

(13) Diaspis bromeliae KER.

TAKAHASHI, Jl. Soc. Trop. Agr., Formosa, III, p. 377 (1931).

Host.—Ananas comosus.

Hab.—Toroku, Kaki, Heito.

(14) Diaspis machili TAKAH.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 1 (1931).

Hosts.—Machilus spp.

Hab.—Maruyama near Taihoku, Shinten, Kanko near Shinten, Kuraru.

(15) Tsukushiaspis vermiformis TAKAH.

Bull. Ent. Res., XXII, p. 215 (1931).

Hosts.—Bambusa spp., Dendrocalamus latiflorus.

Hab.—Taihoku, Tosei.

(16) Tsukushiaspis phragmitis TAKAH.

Bull. Ent. Res., XXII, p. 216 (1931).

Host.—Phragmites sp.

Hab.—Suo, Chippon, Daichikko near Daibu.

(17) Pinnaspis lithocarpi TAKAH.

Bull. Ent. Res., XXII, p. 214 (1931).

Host.—Lithocarpus sp.

Hab.—Hori, Suisha.

(18) Lepidosaphes ficicola TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 378 (1931).

Host.—Ficus nervosa.

Hab.—Shinten.

(19) Lepidosaphes bladhiae TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 379 (1931).

Hosts.—Bladhia spp., Illicium anisatum, Mangifera indica, Vitis sp.

Hab.—Shirin, Taiheizan, Kagi, Kanshirei, Heito, Garambi.

(20) Lepidosaphes sacchari HALL.

TAKAHASHI, Trans. Nat. Hist. Soc. Formosa, XXI, p. 2 (1931).

Host.—Miscanthus sp.

Hab.—Taihoku.



(21) Lepidosaphes cycadicola KUW.

Dobutsugaku Zasshi (Zool. Mag. Tokyo), XLIII, p. 651 (1931).

Host.—Cycas revoluta.

Hab.—Formosa.

(22) Lepidosaphes glaucae TAKAH.

Jl. Soc. Trop. Agr., Formosa, IV, p. 47 (1932).

Host.—Quercus glauca.

Hab.—Shirin, Urai.

(23) Lepidosaphes machili MASK.

Takahashi, Jl. Soc. Trop. Agr., Formosa, III, p. 378 (1931).

Hosts.—Cinnamomum camphora, an orchid.

Hab.—Rato, Kanko near Shinten.

(24) Parlatoria magniferae MARL.

KUWANA and MURAMATSU, Jl. Plant Protect., XIX, p. 11 (1932).

Host.—An orchid.

Hab.—Formosa.

(25) Parlatoria machili TAKAH.

Bull. Ent. Res., XXII, p. 218 (1931).

Hosts.—Machilus spp.

Hab.—Hokuto, Sozan, Taihoku.

(26) Adiscofiorinia ficicola TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 380 (1931).

Host.—Ficus foveolata.

Hab.—Taihoku, Shinten.

(27) Neoparlatoria formosana TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 382 (1931).

Host.—Quercus glauca.

Hab.—Taihoku, Shirin, Urai.

(28) Formosaspis formosana TAKAH.

*Leucaspis formosana*, TAKAHASHI, Trans. Nat. Hist. Soc. Formosa, XXI, p. 2 (1931).

*Formosaspis formosana*, TAKAHASHI, Jl. Soc. Trop. Agr., Formosa, IV, p. 47 (1932).

Host.—Bambusa sp.

Hab.—Suisha.

(29) Fiorinia smilaceti TAKAH.

Bull. Ent. Res., XXII, p. 218 (1931).

Host.—Smilax sp.

Hab.—Shinten.

(30) Aonidia lahoarei TAKAH.

Bull. Ent. Res., XXII, p. 219 (1931).

Host.—Eugenia sp.

Hab.—Sozan, Suisha.

(31) Aspidiotus phragmitis TAKAH.

Trans. Nat. Hist. Soc. Formosa, XXI, p. 4 (1931).

Host.—Phragmites sp.

Hab.—Suo, Daichikko near Daibu, Taihoku.

(32) Aspidiotus euryae TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 383 (1931).

Host.—Eurya sp.

Hab.—Taiheizan, Suisha.

(33) Aspidiotus machili TAKAH.

Jl. Soc. Trop. Agr., Formosa, III, p. 384 (1931).

Host.—Machilus sp.

Hab.—Sozan.



# INDEX


| | PAGE |
|---|---|
| Aclerda | |
| takahashii KUW. | 59 |
| Adiscofiorinia | |
| ficicola TAKAH. | 61 |
| Aonidia | |
| lahoarei TAKAH. | 62 |
| Aspidiotus | |
| euryae TAKAH. | 62 |
| machili TAKAH. | 62 |
| miscanthi KUW. | 62 |
| phragmitis TAKAH. | 54 |
| stauntoniae TAKAH. | 54 |
| tayabanus CKLL. | 56 |
| Asterolecanium | |
| charmoyi GREEN. | 35 |
| lanceolatum GREEN. | 34 |
| pseudolanceolatum TAKAH. | 34 |
| pseudomiliaris Green, var. bambusifoliae TAKAH. | 35 |
| Aulacaspis | |
| cinnamomi NEWST. | 59 |
| murrayae TAKAH. | 59 |
| robuata TAKAH. | 59 |
| spinosa MASK. | 59 |
| Cerococcus | |
| ornatus GREEN. | 59 |
| Chionaspis | |
| atalantiae TAKAH. | 44 |
| brideliae TAKAH. | 43 |
| sozanica TAKAH. | 41 |
| Chrysomphalus | |
| sotetsu TAKAH. | 57 |
| tayabanus CKLL. | 56 |
| Coccus | |
| scolopiae TAKAH. | 35 |
| takanoi TAKAH. | 59 |
| Diaspis | |
| bromeliae KER. | 60 |
| gordoniae TAKAH. | 60 |
| machili TAKAH. | 60 |
| Fiorinia | |
| formosensis TAKAH. | 50 |
| proboscidaria GREEN. | 50 |
| smilaceti TAKAH. | 61 |
| Formosaspis | |
| formosana TAKAH. | 61 |
| Lepidosaphes | |
| bladhiae TAKAH. | 60 |
| cinnamomi TAKAH. | 48 |
| cycadicola KUW. | 61 |
| ficicola TAKAH. | 60 |
| garambiensis TAKAH. | 47 |
| glaucae TAKAH. | 61 |
| imperatae KUW. | 47 |
| intermittens HALL. | 47 |
| machili MASK. | 61 |
| sacchari HALL. | 60 |
| Leucaspis | |
| formosana TAKAH. | 61 |
| Neoparlatoria | |
| formosana TAKAH. | 61 |

| | PAGE |
|---|---|
| Paralecanium | |
| machili TAKAH. ... ... ... ... | 37 |
| Parlatoria | |
| machili TAKAH. ... ... ... ... | 61 |
| machilicola TAKAH. ... ... ... | 52 |
| mangiferae MARL. ... ... ... | 61 |
| Phenacaspis | |
| dilatata GREEN. ... ... ... ... | 46 |
| eugeniae MASK. ... ... ... ... | 45 |
| Phenacoccus | |
| asteris TAKAH. ... ... ... ... | 59 |
| Pinnaspis | |
| lithocarpi TAKAH. ... ... ... | 60 |
| Protopulvinaria | |
| agalmae TAKAH. ... ... ... ... | 39 |
| Pseudococcus | |
| boninsis KUW. ... ... ... ... | 58 |
| Pulvinaria | |
| durantae TAKAH. ... ... ... ... | 59 |
| Silvestraspis | |
| sinensis BELLIO. ... ... ... ... | 52 |
| Trionymus | |
| taiwanus TAKAH.... ... ... ... | 58 |
| Tsukushiaspis | |
| phragmitis TAKAH. ... ... ... | 60 |
| vermiformis TAKAH. ... ... ... | 60 |